

JAVNOZDRAVSTVENI VIDIKI HIGIENE POVRŠIN

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Javnozdravstveni vidiki higiene površin
Course title:	Public health aspects of surfaces hygiene
Članica nosilka/UL	UL ZF
Member:	

Študijski programi in stopnja	Študijska smer	Letnik	Semestri	Izbirnost
Bioznanosti, tretja stopnja, doktorski	Ni členitve (študijski program)		Celoletni	izbirni

Univerzitetna koda predmeta/University course code:	0164180
Koda učne enote na članici/UL Member course code:	0

Predavanja /Lectures	Seminar /Seminar	Vaje /Tutorials	Klinične vaje /Clinical tutorials	Druge oblike študija /Other forms of study	Samostojno delo /Individual student work	ECTS
10	20	0	0	0	95	5

Nosilec predmeta/Lecturer: Rok Fink

Izvajalci predavanj:	Rok Fink, Mojca Jevšnik, Martina Oder, Andrej Ovca
Izvajalci seminarjev:	Rok Fink, Mojca Jevšnik, Martina Oder, Andrej Ovca
Izvajalci vaj:	
Izvajalci kliničnih vaj:	
Izvajalci drugih oblik:	
Izvajalci praktičnega usposabljanja:	

Vrsta predmeta/Course type: teoretični predmet /theoretical course

Jeziki/Languages:	Predavanja/Lectures:	Slovenščina
	Vaje/Tutorial:	Slovenščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisites:
Splošni pogoji za vpis na doktorski študij.	General conditions for enrolment in doctoral studies.

Vsebina:	Content (Syllabus outline):
<ul style="list-style-type: none">Stopnje čistosti površin iz sanitarno-higienskega vidika v bivalnem okolju, v živilski in zdravstveni dejavnosti, v farmacevtski industriji, javnih površinah ter ob izjemnih razmerah.Kriteriji higiensko tehnične analize delovnega procesa z vidika javnega zdravja.Mehanizmi obvladovanja dejavnikov tveganja v procesih živilsko-prehransko-oskrbovalne verige.	<ul style="list-style-type: none">Levels of surface cleanliness from sanitary point of view in the household environment, healthcare, food and pharmaceutical industry, public areas and emergency situations.Criteria for the hygienic-technical analysis of the food process from public health point of view.Mechanisms of risk factor management in food processes.

<ul style="list-style-type: none"> • Usmerjeno inženirsko reševanje higienske problematike v delovnih procesih. • Analiza tveganja s pomočjo različnih sodobnih orodij kakovosti na sanitarnem področju. • Metode dokazovanja higiene površin z indikatorskimi metodami na terenu in s standardnimi postopki v laboratoriju. • Dekontaminacija površin s poudarkom na fizikalnih, kemijskih in bioloških pristopih zagotavljanja čistosti površin. <p>Metode za pripravo super čistih površin z upoštevanjem sprejemljivosti za okolje in zdravje ljudi.</p>	<ul style="list-style-type: none"> • Focused engineering solutions for hygienic problems in processes. • Risk assessment using different modern tools of quality from sanitary point of view. • Methods of surface hygiene assessment with indicator methods, field methods and standard procedures in the laboratory. • Decontamination of surfaces with an emphasis on physical, chemical and biological approaches to ensuring clean surfaces. <p>Methods for the preparation of super-clean surfaces, taking into account the acceptability for the environment and human health.</p>
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Temeljna literatura in viri/Readings:

<ul style="list-style-type: none"> • S. Das, N. Kungwani (2022). Understanding Microbial Biofilms. Fundamentals to Applications. Academic Press. 774 str. <p>revijalni članki s področja, tekoča periodika, druga učna gradiva.</p>
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Cilji in kompetence:

<ul style="list-style-type: none"> • Presojanje različnih stopenj čistosti v bivalnem in delovnem okolju glede na ocenjeno tveganje. • Razumevanje metod dokazovanja higiene površin v specifičnih sanitarno-higienskih pogojih. • Načrtovanje, izvajanje in evalviranje ukrepov za dekontaminacijo površin v higiensko tveganih okoljih. • Poznavanje metod za pripravo super čistih površin v bivalnem in delovnem okolju. • Vzpostavitev mehanizmov in sistemov za obvladovanje prepoznanih dejavnikov tveganj. 	<h3>Objectives and competences:</h3> <ul style="list-style-type: none"> • Assessment of different degrees of cleanliness in household and occupational environment according to the assessed risk. • Understanding methods for proving hygiene of surfaces in specific sanitary conditions. • Planning, implementation and evaluation of measures for surfaces decontamination in hygiene specific environments. • Knowing the methods for preparing super-clean surfaces in household and occupational environment. • Implementation of mechanisms and systems for management of identified risk factors.
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Predvideni študijski rezultati:

<p>Znanje in razumevanje:</p> <ul style="list-style-type: none"> • Presoditi pomen stopenj čistosti površin glede na ocenjeno tveganje v bivalnem in delovnem okolju. • Razlikovati metode dokazovanja čistosti površin glede na vrsto površin, namen analize, vrsto in obseg onesnažil. • Načrtovati, izvajati in evalvirati ukrepe za dekontaminacijo površin ob upoštevanju specifičnih pogojev okolja in naprednih tehnik obvladovanja sanitarno-higienskih tveganj. • Razvijati postopke za pripravo super čistih površin v delovnem in bivalnem okolju, zdravstveni dejavnosti in farmacevtski industriji, javnih površinah ter ob izjemnih razmerah. <p>Študent:</p> <ul style="list-style-type: none"> • Je usposobljen za presojo sanitarno-higienskega stanja v specifičnih okoljskih pogojih, zna načrtovati in izdelati ukrepe za obvladovanje higiene površin. 	<h3>Intended learning outcomes:</h3> <p>Knowledge and understanding:</p> <ul style="list-style-type: none"> • To assess the importance of the degree of surfaces cleanliness regarding the assessed risk in in household and occupational environment. • Distinguish methods of analysing the surfaces cleanliness by type of material, the purpose of analysis, type and extent of pollutants. • Plan, implement and evaluate measures for decontamination of surfaces, taking into account specific environmental conditions and advanced management techniques of hygiene risks. • Develop procedures for the preparation of super-clean surfaces in the occupational and household environment, healthcare, and pharmaceutical industry, public areas and in emergency situations. <p>The student:</p> <ul style="list-style-type: none"> • Is qualified to assess the hygienic condition in specific environmental conditions and to design and develop approached for the surface hygiene management.
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<ul style="list-style-type: none"> Razume javno-zdravstveni, tehnični in higienski vidik procesa V živilsko-prehransko-oskrbovalni verigi. Identificira in oceni dejavnike tveganja za zdravje glede na delovni proces. <p>Načrtuje preventivne in korektivne ukrepe v izbranem delovnem procesu.</p>	<ul style="list-style-type: none"> Understands the public health, technical and hygienic aspect of the food process. Identifies and evaluates risk factors originating from the process. <p>Plans preventive and corrective measures in the selected process.</p>
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Metode poučevanja in učenja:	Learning and teaching methods:
Predavanja, seminarji, problemsko učenje	Lectures, seminars, problem learning

Načini ocenjevanja:	Delež/Weight	Assessment:
Ustni izpit	60,00 %	Oral exam
Seminar	40,00 %	Seminar

Ocenjevalna lestvica:	Grading system:
5 - 10, pri čemer velja, da je pozitivna ocena od 6 - 10	5 - 10, a student passes the exam if he is graded from 6 to 10

Reference nosilca/Lecturer's references:

Rok Fink:

- DAHLE, Sebastian, ŽIGON, Jure, FINK, Rok. Cold plasma for sustainable control of hygienically relevant biofilms : the interaction of plasma distance and exposure time. International journal of environmental health research. 2022.
<https://www.tandfonline.com/doi/full/10.1080/09603123.2022.2149710>, DOI: 10.1080/09603123.2022.2149710. [COBISS.SI-ID 131261699]
- FINK, Rok, FILIP, Sebastjan. Surface-active natural saponins. Properties, safety, and efficacy. International journal of environmental health research. 2022, str. 1-10, ilustr. ISSN 0960-3123. DOI: 10.1080/09603123.2022.2043252. [COBISS.SI-ID 106470915]
- JUKIĆ, Jasmina, KOVAČEVIĆ, Davor, CINDRO, Nikola, FINK, Rok, ODER, Martina, MILISAV, Ana-Marija, POŽAR, Josip. Predicting the outcomes of interpolyelectrolyte neutralization at surfaces on the basis of complexation experiments and vice versa. Soft matter. 2022, vol. 18, iss. 4, str. 744-754. ISSN 1744-6848. <https://pubs.rsc.org/en/content/articlelanding/2022/sm/d1sm01308d>, DOI: 10.1039/d1sm01308d. [COBISS.SI-ID 90353923]
- FINK, Rok, FILIP, Sebastjan. Substitution of potassium sorbate preservative by fermented wheat flour in the production of biscuits : safety, nutritional and sensory characteristic potentials. Acta alimentaria : an International Journal of Food Science. 2021, vol. 50, iss. 2, str. 269-278. ISSN 0139-3006. DOI: 10.1556/066.2020.00298. [COBISS.SI-ID 65007875]
- FINK, Rok, ODER, Martina, JUKIĆ, Jasmina, CINDRO, Nikola, POŽAR, Josip. Soft nanotechnology : the potential of polyelectrolyte multilayers against E. coli adhesion to surfaces. Arhiv za higijenu rada i toksikologiju. [Print ed.]. 2020, vol. 71, no. 1, str. 63-68, ilustr. ISSN 0004-1254.
<https://hrcak.srce.hr/file/343174>, DOI: 10.2478/aiht-2020-71-3319. [COBISS.SI-ID 5789291]
- FINK, Rok, WANG, Zhen, ODER, Martina, BROOKS, Bryan W. Balancing chemical function with reduced environmental health hazards : a joint probability approach to examine antimicrobial product efficacy and mammalian toxicity. Journal of cleaner production. [Print ed.]. Jul. 2020, vol. 262, str. 1-11, ilustr. ISSN 0959-6526. DOI: 10.1016/j.jclepro.2020.121323. [COBISS.SI-ID 5794155]

Martina Oder:

- PILETIĆ, Kaća, KOVAČ, Bruno, PERČIĆ, Marko, ŽIGON, Jure, BROZNIĆ, Dalibor, KARLEUŠA, Ljerka, LUČIĆ BLAGOJEVIĆ, Sanja, ODER, Martina, GOBIN, Ivana. Disinfecting action of gaseous ozone on OXA-48-producing *Klebsiella pneumoniae* biofilm in vitro. International journal of environmental research and public health. [Online ed.]. 2022, vol. 19, iss. 10, str. 1-18, ilustr. ISSN 1660-460 <https://www.mdpi.com/1660-4601/19/10/6177>, DOI: 10.3390/ijerph19106177. [COBISS.SI-ID 108768003]
- JEREB, Gregor, ERŽEN, Ivan, ODER, Martina, POLJŠAK, Borut (avtor, korespondenčni avtor). Phosphate drinking water softeners promote *Legionella* growth. Journal of water and health. 2022, vol. 20, no. 7, str. 1084-1090, ilustr. ISSN 1996-7829.

<https://iwaponline.com/jwh/article/20/7/1084/89592/Phosphate-drinking-water-softeners-promote>, DOI: 10.2166/wh.202055. [COBISS.SI-ID 118381059]

3. PILETIĆ, Kača, KOVAČ, Bruno, PLANINIĆ, Matej, VASILJEV MARCHESI, Vanja, BRČIĆ KARAČONJI, Irena, ŽIGON, Jure, GOBIN, Ivana, ODER, Martina. Combined biocidal effect of gaseous ozone and citric acid on *Acinetobacter baumannii* biofilm formed on ceramic tiles and polystyrene as a novel approach for infection prevention and control. *Processes*. [Online ed.]. 2022, vol. 10, iss. 9, str. 1-15, ilustr. ISSN 2227-9717. <https://www.mdpi.com/2227-9717/10/9/1788>, DOI: 10.3390/pr10091788. [COBISS.SI-ID 120499971]
4. JUKIĆ, Jasmina, KOVAČEVIĆ, Davor, CINDRO, Nikola, FINK, Rok, ODER, Martina, MILISAV, Ana-Marija, POŽAR, Josip. Predicting the outcomes of interpolyelectrolyte neutralization at surfaces on the basis of complexation experiments and vice versa. *Soft matter*. 2022, vol. 18, iss. 4, str. 744-75 ISSN 1744-6848. <https://pubs.rsc.org/en/content/articlelanding/2022/sm/d1sm01308d>, DOI: 10.1039/d1sm01308d. [COBISS.SI-ID 90353923]
5. FINK, Rok, ODER, Martina, JUKIĆ, Jasmina, CINDRO, Nikola, POŽAR, Josip. Soft nanotechnology : the potential of polyelectrolyte multilayers against *E. coli* adhesion to surfaces. *Arhiv za higijenu rada i toksikologiju*. [Print ed.]. 2020, vol. 71, no. 1, str. 63-68, ilustr. ISSN 0004-1254. <https://hrcak.srce.hr/file/343174>, <https://repozitorij.uni-lj.si/IzpisGradiva.php?id=114905&lang=slv>, DOI: 10.2478/aiht-2020-71-3319. [COBISS.SI-ID 5789291]
6. BOHINC, Klemen, BAJUK, Jerca, JUKIĆ, Lucija, ABRAM, Anže, ODER, Martina, GODIČ TORKAR, Karmen, RASPOR, Peter, KOVAČEVIĆ, Davor. Bacterial adhesion capacity of protein-terminating polyelectrolyte multilayers. *International journal of adhesion and adhesives*. [Print ed.]. Dec. 2020, vol. 103, str. 1-8. ISSN 0143-749 DOI: 10.1016/j.ijadhadh.2020.102687. [COBISS.SI-ID 25856771]

Mojca Jevšnik:

1. OVCA, Andrej, ŠKUFCA, Tina, JEVŠNIK, Mojca. Temperatures and storage conditions in domestic refrigerators - Slovenian scenario. *Food control*. [Print ed.]. May 2021, vol. 123, str. 1-7, ilustr. ISSN 0956-7135. DOI: 10.1016/j.foodcont.2020.107715. [COBISS.SI-ID 49736451]
2. JEVŠNIK, Mojca, ČESEN, Anja, ŠANTIĆ, Marina, OVCA, Andrej. Food safety knowledge and practices of pregnant women and postpartum mothers in Slovenia. *Foods*. 2021, vol. 10, iss. 10, str. 1-12, tabele. ISSN 2304-8158. <https://www.mdpi.com/2304-8158/10/10/2412>, DOI: 10.3390/foods10102412. [COBISS.SI-ID 80355843]
3. ZORE, Anamarija, BEZEK, Katja, JEVŠNIK, Mojca, ABRAM, Anže, RUNKO, Valentina, SLIŠKOVIĆ, Irena, RASPOR, Peter, KOVAČEVIĆ, Davor, BOHINC, Klemen. Bacterial adhesion rate on food grade ceramics and Teflon as kitchen worktop surfaces. *International journal of food microbiology*. [Print ed.]. 2020, vol. 332, str. 108764-1-108764-5, ilustr. ISSN 0168-1605. DOI: 10.1016/j.ijfoodmicro.2020.108764. [COBISS.SI-ID 20404739]
4. SLABE, Damjan, DOLENC, Eva, JEVŠNIK, Mojca (avtor, korespondenčni avtor). Hygiene and food safety habits among Slovenian mountaineers. *Processes*. [Online ed.]. 2022, vol. 10, iss. 9, str. 1-15, ilustr. ISSN 2227-9717. <https://www.mdpi.com/2227-9717/10/9/1856>, DOI: 10.3390/pr10091856. [COBISS.SI-ID 122126851]
5. JEVŠNIK, Mojca (avtor, korespondenčni avtor), PIRC, Lucija, OVCA, Andrej, ŠANTIĆ, Marina, RASPOR, Peter, GODIČ TORKAR, Karmen. A multimethod study on kitchen hygiene, consumer knowledge and food handling practices at home. *Processes*. [Online ed.]. 2022, vol. 10, iss. 10, str. 1-15, ilustr. ISSN 2227-9717. <https://www.mdpi.com/2227-9717/10/10/2104>, DOI: 10.3390/pr10102104. [COBISS.SI-ID 126002435]
6. JEVŠNIK, Mojca (avtor, korespondenčni avtor), RASPOR, Peter. Food safety knowledge and behaviour among food handlers in catering establishments : a case study. *British food journal*. 2022, vol. 124, no. 10, str. 3293-3307. ISSN 0007-070X. <https://www.emerald.com/insight/content/doi/10.1108/BFJ-09-2020-0795/full/html>, DOI: 10.1108/BFJ-09-2020-0795. [COBISS.SI-ID 92619011]

Andrej Ovca:

1. JEVŠNIK, Mojca, PIRC, Lucija, OVCA, Andrej, ŠANTIĆ, Marina, RASPOR, Peter, GODIČ TORKAR, Karmen. A multimethod study on kitchen hygiene, consumer knowledge and food handling practices at home. *Processes*. [Online ed.]. 2022, vol. 10, iss. 10, str. 1-15, ilustr. ISSN 2227-9717. <https://www.mdpi.com/2227-9717/10/10/2104>, DOI: [10.3390/pr10102104](https://doi.org/10.3390/pr10102104). [COBISS.SI-ID 126002435]
2. PREVOLŠEK, Vanja, OVCA, Andrej, JEVŠNIK, Mojca. Fulfilment of technical and hygienic requirements among street food vendors in Slovenia. *British food journal*. 2021, vol. 123, no. 13, str. 105-123. ISSN 0007-070X. <https://www.emerald.com/insight/content/doi/10.1108/BFJ-11-2020-1056/full/html>, DOI: [10.1108/BFJ-11-2020-1056](https://doi.org/10.1108/BFJ-11-2020-1056). [COBISS.SI-ID 60003843]

3. OVCA, Andrej, ŠKUFCA, Tina, JEVŠNIK, Mojca. Temperatures and storage conditions in domestic refrigerators - Slovenian scenario. Food control. [Print ed.]. May 2021, vol. 123, str. 1-7, ilustr. ISSN 0956-7135. DOI: [10.1016/j.foodcont.2020.107715](https://doi.org/10.1016/j.foodcont.2020.107715). [COBISS.SI-ID [49736451](#)]
financer: ARRS, P3-0388
4. JEVŠNIK, Mojca, ČESEN, Anja, ŠANTIĆ, Marina, OVCA, Andrej. Food safety knowledge and practices of pregnant women and postpartum mothers in Slovenia. Foods. 2021, vol. 10, iss. 10, str. 1-12, tabele. ISSN 2304-8158. <https://www.mdpi.com/2304-8158/10/10/2412>, DOI: [10.3390/foods10102412](https://doi.org/10.3390/foods10102412). [COBISS.SI-ID [80355843](#)]
5. MILLIKEN, Sarah, OVCA, Andrej, ANTENEN, Nadine, VILLARROEL, Morris, GRIESSLER BULC, Tjaša, KOTZEN, Benz, JUNGE-BERBEROVIC, Ranka. Aqu@teach - the first aquaponics curriculum to be developed specifically for university students. Horticulturae. 2021, vol. 7, iss. 2, str. 1-9. ISSN 2311-7524. <https://www.mdpi.com/2311-7524/7/2/18>, <https://repozitorij.uni-lj.si/IzpisGradiva.php?id=124531&lang=slv>, DOI: [10.3390/horticulturae7020018](https://doi.org/10.3390/horticulturae7020018). [COBISS.SI-ID [49248259](#)]

KAKOVOST IN VARNOST ŽIVIL

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Kakovost in varnost živil
Course title:	Food quality and safety
Članica nosilka/UL Member:	UL BF

Študijski programi in stopnja	Študijska smer	Letnik	Semestri	Izbirnost
Bioznanosti, tretja stopnja, doktorski	Ni členitve (študijski program)		Celoletni	izbirni

Univerzitetna koda predmeta/University course code:	0037366
Koda učne enote na članici/UL Member course code:	3869

Predavanja /Lectures	Seminar /Seminar	Vaje /Tutorials	Klinične vaje /Clinical tutorials	Druge oblike študija /Other forms of study	Samostojno delo /Individual student work	ECTS
20	40	0	0	10	180	10

Nosilec predmeta/Lecturer:	Sonja Smole Možina
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Izvajalci predavanj:	Helena Abramovič, Jasna Bertoncelj, Barbka Jeršek, Sonja Smole Možina
Izvajalci seminarjev:	
Izvajalci vaj:	
Izvajalci kliničnih vaj:	
Izvajalci drugih oblik:	
Izvajalci praktičnega usposabljanja:	

Vrsta predmeta/Course type:	teoretični/theoretical
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Jeziki/Languages:	Predavanja/Lectures:	Angleščina, Slovenščina
	Vaje/Tutorial:	Angleščina, Slovenščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisites:
Splošni pogoji za vpis na doktorski študij	General conditions for enrolment in doctoral studies.

Vsebina:	Content (Syllabus outline):
Vsebinski poudarki predmeta vključujejo naslednje teme: Celostno obvladovanje varnosti in kakovosti živil; Analiza tveganj v živilski proizvodnji, vključno s stranskimi proizvodi in odpadki agro-živilstva in možnostmi njihovega ponovnega vključevanja v proizvodno verigo kakovostne in varne hrane in krme s podaljšano obstojnostjo).	The main points in the contents of the subject are as follows: Integral concepts of food safety and quality management; Risk assessment in food processing (including risk assessment of food by-products and wastes for possible further processing into high quality and safe food or feed products or additives with prolonged shelf-life.

<p>Teoretične osnove procesov oksidativnih pretvorb v živilih; predstavitev sodobnih pristopov k določitvi in vrednotenju razvoja oksidativnih sprememb v živilskih izdelkih ter njihovemu preprečevanju. Povezava omenjenih procesov s kemijsko sestavo in strukturnimi lastnostmi živil. Vpliv oksidacije sestavin živila na prehransko vrednost, varnost in senzorične lastnosti živil.</p> <p>Termično in netermično procesiranje živil z vidika kakovosti in varnosti živilskih izdelkov.</p> <p>Vrednotenje kakovosti hrane s fizikalno-kemijskimi parametri</p> <p>Senzorična analiza v vlogi zagotavljanja kakovosti in obstojnosti živil.</p> <p>Odkrivanje nedovoljenih postopkov in ponaredkov, ugotavljanje pristnosti živil, metodološki pristopi in primeri iz prakse.</p> <p>Ocena kemijskih, bioloških (mikrobioloških, biotehnoških), fizikalnih tveganj. Ocena vloge sodobnih nanotehnologij za zagotavljanje kakovosti in varnosti hrane.</p> <p>Principi sledljivosti v proizvodno-prehranskih oskrbovalnih verigah. Kompetence in odgovornosti nosilcev dejavnosti od kmeta do kupca za zagotavljanje kakovosti in varnosti v proizvodno-prehranskih oskrbovalnih verigah. Vloga zunanjih dejavnikov (npr. državnih sistemov nadzora, javnih medijev, izobraževalnega sistema itd.) v sistemu preprečevanja tveganj oz. zagotavljanja varnosti in kakovosti hrane. Etika v sistemu zagotavljanja kakovosti in varnosti hrane. Predstavitev in analiza primerov iz prakse in raziskovalnih projektov. Kaj se lahko naučimo iz obojih?</p> <p>Mikrobna fiziologija v pogojih minimalnega konzerviranja hrane v luči zahtev za zagotavljanje varnih živil.</p> <p>Gensko spremenjeni organizmi v živilih – analitika in in sistem kakovosti po ISO 17025.</p> <p>Novi tehnološki pristopi za zagotavljanje varnosti in kakovosti hrane (in krme) v razmerah minimalnega procesiranja (novi materiali za zmanjševanje problema adhezivnosti mikroorganizmov na površine, tvorbe mikrobnih biofilmov in drugih oblik perzistentnosti mikrobnih povzročiteljev kvarjenja in okužb, ki predstavljajo tveganje za varnost in kakovost živilskih proizvodov, razvoj novih protimikrobnih sredstev v boju proti odpornosti na klasične biocide oz. mikrobicide, strategije reševanja kot so aktivno pakiranje, biološka kontrola, kombinirano konzerviranje, higienski design itd.) Koncepti ocenjevanja varnosti v proizvodno-prehranski oskrbovalni verigi</p>	<p>Description of theoretical bases, which describe the processes of oxidative transformations in food; presentation of advanced approaches to determining and evaluation of the development of oxidative changes in food products and their prevention. Connection of these processes with chemical composition and structural properties of food. Impact of food component oxidation on nutritional value, safety and sensory properties of food.</p> <p>Thermal and non-thermal processing of food – quality and safety aspects.</p> <p>Physico-chemical parameters of food quality assessment.</p> <p>Sensoric analysis of food products – its role in food safety and quality management and shelf-life determination.</p> <p>Food authenticity; Detection of unacceptable procedures and falsification; Methodological approaches and case studies of food adulteration; Assessment of chemical, biological (microbiological and biotechnological) and physical hazards.</p> <p>Assessment of advances in nanotechnologies for food quality and safety;</p> <p>Principles of traceability in food production and supply chains. Competences and responsibilities of all stakeholders from the farmer to the consumer for ensuring quality and safety in the food chain. The role of extrinsic factors (e.g. national surveillance and inspection systems, public media, education system etc.) for risk management and ensuring quality and safety in food production and supply chains. Ethics in the system of food quality and safety. Analysis of case studies from the practice and from recent research projects. What we could learn from them?</p> <p>Microbial physiology in minimal processing of foods in the light of food safety requirements.</p> <p>Genetically modified organisms in food – novelties in analytics and requirements for food safety according to ISO 17025;</p> <p>Novel technological principles for food and feed safety and quality management under conditions of minimal processing (e.g., role of new materials for reducing the problem of microbial adhesion on surfaces, microbial biofilm formation and other forms of persistence of microorganisms presenting the risk of food spoilage or transmission of diseases; the problem of increasing resistance to antimicrobial agents, novel strategies such as active packaging, biological control, hurdle technologies, hygienic design etc.). General concepts of safety assessment in the food production and supply chains.</p>
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Temeljna literatura in viri/Readings:

Present knowledge in Food Safety: A risk based approach through the food chain. Academic Press 2023; 1154 str. (izbrana poglavja).

Evaluation Technologies for Food Quality. Zhong J. (Ur.), Wang X. (Ur.). Cambridge, Woodhead Publishing, Elsevier, 2019; 914 str. (izbrana poglavja)

Klančnik, A., Sterniša, M., Demšar, L. Smole Možina, Sonja. 2019. Konvencionalni in alternativni načini konzerviranja hrane = Conventional and alternative ways of food preservation. V: *Živilstvo in prebrana med tradicijo in inovacijo = Food science, technology and nutrition between tradition and innovation : 30. Bitenčevi živilski dnevi 2019 = 30th Food Technology Days 2019 dedicated to Prof. F. Bitenc : 19. junij 2019, Ljubljana*. 30. Bitenčevi živilski dnevi 2019 = 30th Food Technology Days 2019 dedicated to Prof. F. Bitenc, 19. junij 2019, Ljubljana. 1. elektronska izd. Ljubljana: Biotehniška fakulteta, Oddelek za živilstvo, 2019. Str. 40-58

Aktualni znanstveni in pregledni članki, ki so javno dostopni preko spleta.

Cilji in kompetence:

Usposobitev kandidata za izvedbo najzahtevnejših nalog na področju in opravljanje raziskav, katerih rezultati bodo predstavljali pomembne prispevke temeljni ali aplikativni znanosti na področju kakovosti in varnosti živil.

Objectives and competences:

The candidate should acquire theoretical knowledge and skills for food quality and safety management and also for basic and applied research work that can provide important results in the field of food quality and safety.

Predvideni študijski rezultati:

Kandidatovo poznavanje in razumevanje procesov, ki so povezani z izgubo kakovosti hrane in tveganji za zdravje potrošnika, poznavanje pomena in uporabnosti klasičnih in sodobnih fizikalnih, kemijskih, senzoričnih, mikrobioloških in biotehnoloških principov in metod za nadzor in vrednotenje kakovosti in varnosti živilskih izdelkov oz. proizvodno-prehranskih oskrbovalnih verig.

Intended learning outcomes:

Knowledge and understanding of the processes associated with loss of food quality and safety, knowledge of the importance and usefulness of traditional and modern physical, chemical, sensory, microbiological and biotechnological approaches for determination and evaluation of quality and safety of food products and processes along the whole food production and supply chains.

Metode poučevanja in učenja:

Predavanja, samostojen študij in izdelava projektne naloge.

Learning and teaching methods:

Lectures, individual study, project work.

Načini ocenjevanja:

Delež/Weight

Assessment:

Načini ocenjevanja:	Delež/Weight	Assessment:
Ocena seminarskega dela	50,00 %	Assessment of the seminar work
Ocena izpita	50,00 %	Written examination

Ocenjevalna lestvica:

5 - 10, pri čemer velja, da je pozitivna ocena od 6 - 10

Grading system:

5 - 10, a student passes the exam if he is graded from 6 to 10

Reference nosilca/Lecturer's references:

Helena Abramovič

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Jasna Bertoncej

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Barbara Jeršek

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4. TOPLAK, Nataša, KOREN, Simon, JERŠEK, Miha, KOVAČ, Minka, ŠUŠTAR, Mateja, GOLEŽ, Mateja, ZARNIK, Blaž, JERŠEK, Barbara. Diversity of bacterial populations with iron oxide/hydroxide formations in the abandoned Sitarjevec mine (Slovenia). *Geomicrobiology journal*. 2021, vol. 38, no. 2, str. 164-173, ilustr., zvd. ISSN 0149-0451. DOI: [10.1080/01490451.2020.1822470](https://doi.org/10.1080/01490451.2020.1822470). [COBISS.SI-ID [29474307](https://www.cobiss.si/record/29474307)]
5. RIBIČ, Urška, POLAK, Tomaž, LUŠNIC POLAK, Mateja, KLANČNIK, Anja, JERŠEK, Barbara. Adaptation response mechanisms of *Staphylococcus epidermidis* strains exposed to increasing concentrations of didecyldimethylammonium chloride. *Microbial drug resistance*. 2020, vol. 26, no. 6, str. 583-593. ISSN 1076-6294. DOI: [10.1089/mdr.2019.0064](https://doi.org/10.1089/mdr.2019.0064). [COBISS.SI-ID [5147000](https://www.cobiss.si/record/5147000)]
6. KLANČNIK, Anja, GOBIN, Ivana, JERŠEK, Barbara, SMOLE MOŽINA, Sonja, VUČKOVIĆ, Darinka, TUŠEK-ŽNIDARIČ, Magda, ABRAM, Maja. Adhesion of *Campylobacter jejuni* is increased in association with foodborne bacteria. *Microorganisms*. 2020, vol. 8, iss. 2, str. 1-14, ilustr. ISSN 2076-2607. <https://www.mdpi.com/2076-2607/8/2/201>, DOI: [10.3390/microorganisms8020201](https://doi.org/10.3390/microorganisms8020201). [COBISS.SI-ID [5171320](https://www.cobiss.si/record/5171320)]

KAKOVOST PROIZVODOV ŽIVALSKEGA POREKLA

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Kakovost proizvodov živalskega porekla
Course title:	The quality of the products of animal origin
Članica nosilka/UL Member:	UL BF

Študijski programi in stopnja	Študijska smer	Letnik	Semestri	Izbirnost
Bioznanosti, tretja stopnja, doktorski	Ni členitve (študijski program)		Celoletni	izbirni

Univerzitetna koda predmeta/University course code:	0037349
Koda učne enote na članici/UL Member course code:	3852

Predavanja /Lectures	Seminar /Seminar	Vaje /Tutorials	Klinične vaje /Clinical tutorials	Druge oblike študija /Other forms of study	Samostojno delo /Individual student work	ECTS
	10	10	0	5	100	5

Nosilec predmeta/Lecturer: Marija Klopčič

Izvajalci predavanj:	Marija Klopčič
Izvajalci seminarjev:	Marija Klopčič
Izvajalci vaj:	
Izvajalci kliničnih vaj:	
Izvajalci drugih oblik:	
Izvajalci praktičnega usposabljanja:	

Vrsta predmeta/Course type: individualno raziskovalni/individual research

Jeziki/Languages:	Predavanja/Lectures:	Angleščina, Slovenščina
	Vaje/Tutorial:	Angleščina, Slovenščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisites:
Splošni pogoji za vpis na doktorski študij	General conditions for enrolment in doctoral studies.

Vsebina:	Content (Syllabus outline):
<ul style="list-style-type: none">Proizvodni sistemi in njihov vpliv na kakovost jajc, mesa in mlekaAnaliza vpliva nekaterih dejavnikov (pasma-križanec, starost, prehrana, način reje, sezona, transport, postopki pri zakolu) na kakovost mleka, mesa in jajc.Povezava med rastjo in kakovostjo mesa.Problem spolnega vonja maščobe merjascev.Senzorično zaznavanje izdelkov prašičjega mesa.	<ul style="list-style-type: none">production systems and their impact on the quality of eggs, meat and milk,the analysis of the influence of certain factors (a cross-breed, age, diet, type, season, transport, slaughter procedures) on the quality of the milk, meat and eggsthe link between growth and quality of the meatthe problem of the sexual scent of fat boarthe sensory perception of pig meat products

<ul style="list-style-type: none"> • Svežost jajc in metode za ohranjanje njihove svežosti. • Vpliv okolja in novih tehnologij na kakovost mleka in mesa. • Kakovost ekoloških živil živalskega porekla v primerjavi s konvencionalnimi živili živalskega porekla (brez GSO in z GSO). • Vpliv veterinarskih medicinskih sredstev na kakovost in varnost živil. • Dejavniki tveganja (vezano na kakovost in varnost) pri prireji mleka in mesa. • Sheme kakovosti kmetijskih proizvodov in živil (s poudarkom na živinorejskih proizvodih). • Uporaba proteomike za nadzor kakovosti surovin živalskega porekla. 	<ul style="list-style-type: none"> • the freshness of the eggs, and methods to preserve their freshness • the impact of the environment and new technologies on the quality of milk and meat • the quality of organic foods of animal origin compared to conventional foodstuffs of animal origin (GMO and GMO-free) • the impact of veterinary medical resources on food quality and safety • risk factors (linked to the quality and safety) in the production of milk and meat. • quality schemes of agricultural products and foodstuffs (with an emphasis on livestock products) • use of Proteomics for the quality control of raw materials of animal origin.
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Temeljna literatura in viri/Readings:

Petersen B., Nüssel M., Hamer M. 2014. Quality and risk management in agri-food chains. Wageningen Academic Publisher: 320 str. ISBN: 978-90-8686-236-8

Klopčič M., Kuipers A. Hocquette J.F. 2012. Consumer attitudes to food quality products. Wageningen Academic Publisher: EAAP Scientific Series Volume 133: 304 str., ISBN: 978-90-8686-207-8

Luning A.P., Marcelis W.J. 2009. Food quality management Technological and managerial principles and practices. Wageningen Academic Publisher: 426 str., ISBN: 978-90-8686-116-3

Zollitsch W., Winkler C., Waiblinger S., Haslberger A. 2007. Sustainable food production and ethics. Wageningen Academic Publisher: 550 str., ISBN: 978-90-8686-046-3

[Pieterneel A. Luning](#) and [Willem J. Marcelis](#). 2020. [Food quality management: Technological and managerial principles and practices](#). 474 str., ISBN: 978-90-8686-348-8; <https://doi.org/10.3920/978-90-8686-899-5>

[Grunert Klaus G](#). 2017. [Consumer trends and new product opportunities in the food sector](#). 236 str., ISBN: 978-90-8686-307-5; <https://doi.org/10.3920/978-90-8686-852-0>

Priporočena literatura in viri/Readings:

Luning A.P., Marcelis W.J. 2009. Food quality management Technological and managerial principles and practices. Wageningen Academic Publisher: 426 str., ISBN: 978-90-8686-116-3

[Pieterneel A. Luning](#) and [Willem J. Marcelis](#). 2020. [Food quality management: Technological and managerial principles and practices](#). 474 str., ISBN: 978-90-8686-348-8; <https://doi.org/10.3920/978-90-8686-899-5>

Cilji in kompetence:

Slušatelji spoznajo postopke in tehnologije reje, dejavnike ki vplivajo na kakovost proizvodov živalskega porekla in nadgradijo znanja o biokemijskih in mikrobioloških procesih, ki potekajo med predelavo mleka ali mesa. Spoznajo postopke pri oblikovanju proizvodov višje ali posebne kakovosti ter postopke nadzora pri zagotavljanju kakovosti in varnosti proizvodov živalskega porekla. Spoznali bodo tudi razlike med ekološkimi in konvencionalnim načinom proizvodnje ter razlike v kakovosti. Usposobijo se za samostojno vodenje in načrtovanje prireje in predelave proizvodov živalskega porekla.

Objectives and competences:

Students learn about the processes and techniques of farming, the factors that affect the quality of the products of animal origin and to build up knowledge of the biochemical and microbiological processes, taking place during the processing of milk or meat. Learn about procedures in the design of products and higher or special quality, monitoring to ensure the quality and safety of products of animal origin. Students will also learn about the differences between organic and conventional production methods and the difference in quality. Qualification for independent management and the planning of production and processing of products of animal origin.

Predvideni študijski rezultati:

Intended learning outcomes:

Poznavanje in razumevanje kriterijev za doseganje in ocenjevanje kakovosti proizvodov živalskega porekla od hleva do mize.	Knowledge and understanding: Knowledge and understanding of the criteria for achieving and assessing the quality of the products of animal origin from the stable to the table.
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Metode poučevanja in učenja: Predavanja, konzultacije, seminarsko delo.	Learning and teaching methods: Lectures, consultations, seminar workshops.
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Načini ocenjevanja:	Delež/Weight	Assessment:
• seminarska naloga na temo kakovosti proizvodov živalskega porekla	40,00 %	• Seminar work about Quality of the products of animal origin
• pisni izpit	60,00 %	• Written Exam

Ocenjevalna lestvica: 5 - 10, pri čemer velja, da je pozitivna ocena od 6 - 10	Grading system: 5 - 10, a student passes the exam if he is graded from 6 to 10
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Reference nosilca/Lecturer's references:

Klopčič Marija

- KOS-SKUBIC, Mira, KLOPČIČ, Marija, ULE, Anita, ERJAVEC, Karmen. The food quality labels : awareness and knowledge of Slovenian consumers. *Agro food industry hi-tech*. 2017, vol. 28, no. 6, str. 64-67. ISSN 1722-6996. [COBISS.SI-ID 4000648]
- KLOPČIČ, Marija, SLOKAN, Polona, ERJAVEC, Karmen. Consumer preference for nutrition and health claims: a multi-methodological approach. *Food quality and preference*. [Print ed.]. 2020, vol. 82, no. 103863, str. 1-10. ISSN 0950-3293.
<https://www.sciencedirect.com/science/article/pii/S0950329319306305>, DOI: 10.1016/j.foodqual.2019.103863. [COBISS.SI-ID 4343176], [ICR, SNIP, WoS do 12. 1. 2022: št. citatov (TC): 21, čistih citatov (CI): 20, čistih citatov na avtorja (CIAu): 6,67, Scopus do 11. 1. 2022: št. citatov (TC): 22, čistih citatov (CI): 22, čistih citatov na avtorja (CIAu): 7,33]
- KOS-SKUBIC, Mira, ERJAVEC, Karmen, ULE, Anita, KLOPČIČ, Marija. Consumers' hedonic liking of different labeled and conventional food products in Slovenia. *Journal of sensory studies*. 2018, vol. 33, no. 5, str. 1-8, ilustr. ISSN 0887-8250. <https://doi.org/10.1111/joss.12444>, DOI: 10.1111/joss.12444. [COBISS.SI-ID 4112264], [ICR, SNIP, WoS do 13. 1. 2022: št. citatov (TC): 10, čistih citatov (CI): 10, čistih citatov na avtorja (CIAu): 2,50, Scopus do 6. 1. 2022: št. citatov (TC): 10, čistih citatov (CI): 10, čistih citatov na avtorja (CIAu): 2,50]
- KOS-SKUBIC, Mira, ERJAVEC, Karmen, KLOPČIČ, Marija. Consumer awareness of PDO-labelled food in Slovenia. *Italian Journal of Animal Science*. 2019, vol. 18, no. 1, str. 366-371. ISSN 1594-4077. <https://www.tandfonline.com/doi/full/10.1080/1828051X.2018.1530959>, DOI: 10.1080/1828051X.2018.1530959. [COBISS.SI-ID 4176520], [ICR, SNIP, WoS do 26. 11. 2021: št. citatov (TC): 6, čistih citatov (CI): 6, čistih citatov na avtorja (CIAu): 2,00, Scopus do 30. 6. 2021: št. citatov (TC): 5, čistih citatov (CI): 5, čistih citatov na avtorja (CIAu): 1,67]
- KOS-SKUBIC, Mira, ERJAVEC, Karmen, KLOPČIČ, Marija. Consumer preferences regarding national and EU quality labels for cheese, ham and honey : the case of Slovenia. *British food journal*. 2018, vol. 120, no. 3, str. 650-664. ISSN 0007-070X. <https://www.emeraldinsight.com/doi/pdfplus/10.1108/BFJ-04-2017-0236>, DOI: 10.1108/BFJ-04-2017-0236. [COBISS.SI-ID 4059016], [ICR, SNIP, WoS do 8. 1. 2022: št. citatov (TC): 15, čistih citatov (CI): 14, čistih citatov na avtorja (CIAu): 4,67, Scopus do 23. 9. 2021: št. citatov (TC): 14, čistih citatov (CI): 13, čistih citatov na avtorja (CIAu): 4,33]
- RAATS, Monique, MALCOLM, Rosalind N., LÄHTEENMÄKI, Liisa, PRAVST, Igor, GAGE, Heather, CLEARY, A., KLOPČIČ, Marija. Understanding the impact of European Regulation on the substantiation and use of claims on food and drinks : design of the REDICLAIM project and initial results. *Nutrition bulletin*. 2015, vol. 40, no. 4, str. 340-348. ISSN 1471-9827. <http://onlinelibrary.wiley.com/doi/10.1111/nbu.12179/epdf>, DOI: 10.1111/nbu.12179. [COBISS.SI-ID 3704200], [SNIP, WoS do 9. 8. 2021: št. citatov (TC): 10, čistih citatov (CI): 4, čistih citatov na avtorja (CIAu): 0,57, Scopus do 13. 4. 2021: št. citatov (TC): 11, čistih citatov (CI): 6, čistih citatov na avtorja (CIAu): 0,86]

7. ULE, Anita, PREPADNIK, Helena, KLOPČIČ, Marija. The freezing point of bulk tank milk in Slovenia. V: DOVČ, Peter (ur.). *Technology driven animal production*. 24th International Symposium Animal Science Days, Ptuj, September 21st-23rd, 2016. Ljubljana: Biotechnical Faculty, 2016. Suppl. 5, str. 84-88. Acta agriculturae slovenica, Supplement, 2016, 5. ISBN 978-961-6379-36-6. ISSN 1854-4800. <http://aas.bf.uni-lj.si/zootehnika/supl/5-2016/PDF/5-2016-84-88.pdf>. [COBISS.SI-ID 3788168]
8. KUŠAR, Anita, ŽMITEK, Katja, LÄHTEENMÄKI, Liisa, RAATS, Monique, PRAVST, Igor, ZUPANIČ, Nina (sodelavec pri raziskavi), LAVRIŠA, Živa (sodelavec pri raziskavi), MIKLAVEC, Krista (sodelavec pri raziskavi), KLOPČIČ, Marija (sodelavec pri raziskavi), et al. Comparison of requirements for using health claims on foods in the European Union, the USA, Canada, and Australia/New Zealand. *Comprehensive reviews in food science and food safety*. 2021, iss. 2, vol. 20, str. 1307-1332. ISSN 1541-4337. <https://onlinelibrary.wiley.com/doi/full/10.1111/1541-4337.12716>, DOI: [10.1111/1541-4337.12716](https://doi.org/10.1111/1541-4337.12716). [COBISS.SI-ID 51072259], [JCR, SNIP, WoS do 9. 8. 2021: št. citatov (TC): 1, čistih citatov (CI): 0, čistih citatov na avtorja (CIAu): 0,00, Scopus]
9. GALAMA, Paul, OUWELTJES, Wijbrand, ENDRES, Marcia, SPRECHER, J. R., LESO, L., KUIPERS, Abele, KLOPČIČ, Marija. Future of housing for dairy cattle : symposium review. *Journal of dairy science*. 2020, vol. 103, no. 6, str. 5759-5772, ilustr. ISSN 0022-0302. <https://www.sciencedirect.com/science/article/pii/S0022030220302988?via%3Dihub>, DOI: [10.3168/jds.2019-17214](https://doi.org/10.3168/jds.2019-17214). [COBISS.SI-ID 16824067], [JCR, SNIP, WoS do 9. 11. 2021: št. citatov (TC): 7, čistih citatov (CI): 6, čistih citatov na avtorja (CIAu): 0,86, Scopus do 27. 10. 2021: št. citatov (TC): 8, čistih citatov (CI): 8, čistih citatov na avtorja (CIAu): 1,14]
10. KOS-SKUBIC, Mira, KLOPČIČ, Marija. Sheme kakovosti upoštevajoč zakonodajo EU in poznavanje teh shem pri potrošnikih v Sloveniji = Quality schemes as a part of EU legislation and knowledge of quality schemes by consumers in Slovenia : Elektronski vir. V: MAČEK JERALA, Milena (ur.), MAČEK, Melita Ana (ur.). *Znanje in izkušnje za nove podjetniške priložnosti : zbornik referatov = Knowledge and experience for new entrepreneurial opportunities : collection of papers*. 2. znanstvena konferenca z mednarodno udeležbo s področja kmetijstva, naravovarstva, hortikulture in živilstva, Strahinj, Biotehniški center Naklo, 24.-25. april 2013 = 2nd Scientific Conference with International Participation on Agriculture, Environmentalism, Horticulture, Food Production and Processing, Strahinj, Biotechnical Centre Naklo, 24th-25th April 2013. Strahinj: Biotehniški center Naklo, 2013. Str. 433-438. ISBN 978-961-93153-8-5. [COBISS.SI-ID 3228552]

KLINIČNA PREHRANA

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Klinična prehrana
Course title:	Clinical nutrition
Članica nosilka/UL Member:	UL BF

Študijski programi in stopnja	Študijska smer	Letnik	Semestri	Izbirnost
Bioznanosti, tretja stopnja, doktorski	Ni členitve (študijski program)		Celoletni	izbirni

Univerzitetna koda predmeta/University course code:	0164182
Koda učne enote na članici/UL Member course code:	0

Predavanja /Lectures	Seminar /Seminar	Vaje /Tutorials	Klinične vaje /Clinical tutorials	Druge oblike študija /Other forms of study	Samostojno delo /Individual student work	ECTS
10	35	0	0	0	80	5

Nosilec predmeta/Lecturer: Evgen Benedik

Izvajalci predavanj: Evgen Benedik
Izvajalci seminarjev:
Izvajalci vaj:
Izvajalci kliničnih vaj:
Izvajalci drugih oblik:
Izvajalci praktičnega usposabljanja:

Vrsta predmeta/Course type: teoretični/theoretical

Jeziki/Languages:	Predavanja/Lectures:	Slovenščina
	Vaje/Tutorial:	Slovenščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Diplomanti enovitih magistrskih študijskih programov in študijskih programov 2. stopnje s področja biomedicinskih ali biotehniških usmeritev.

Prerequisites:

Graduates of single master's degree programmes and second cycle degree programmes in biomedical or biotechnical fields.

Vsebina:

Pojem prehranskega statusa
Proces prehranske obravnave:
- Presejalni testi za ugotavljanje prehranske ogroženosti
- Prehranski pregled
Ocena prehranskega statusa in vloga kliničnih podatkov (zdravstveno stanje)

Content (Syllabus outline):

The concept of nutritional status
The nutrition care process (nutritional evaluation):
- Malnutrition risk screening
- Nutritional assessment
Assessment of nutritional status and the role of clinical data (health status)

<p>Antropometrične meritve, indeksi in meritve telesne sestave ter uporaba normativov</p> <p>Metode ugotavljanja prehranskega vnosa</p> <ul style="list-style-type: none"> - Metoda jedilnika prejšnjega dne - Metoda ocenjene ali tehtane količine obroka - Papirni prehranski dnevniki - Elektronski prehranski dnevniki - Vprašalniki pogostosti uživanja živil <p>Uporaba računalniških programov za izračun in ovrednotenje prehranskega vnosa (Prodi Expert plus, Nemčija; Odprta platforma za klinično prehrano, OPKP).</p> <p>Primerjava vnosa energije in hranil s prehranskimi priporočili (D-A-CH Referenčne vrednosti za vnos hranil, ESPGHAN, ESPEN, WHO) in interpretacija rezultatov.</p> <p>Organizacija vrtčevske/šolske prehrane in prehrane odraslih (tudi prehrane v domovih za ostarele) v relaciji z zagotavljanjem ustreznih diet</p> <p>Plan prehranske obravnave</p> <p>Prehranska podpora in terapija</p> <p>Spremljanje učinka prehranske podpore in terapije</p> <p>Dokumentacija</p> <p>Klinična prehrana pri različnih bolezenskih stanjih:</p> <ul style="list-style-type: none"> • Pediatrična klinična prehrana • Prehranjenost/podhranjenost • Metabolni sindrom • Motnje hranjenja • Alergije • Intolerance • Odpoved različnih organskih sistemov • Prehrana v intenzivni neki • Prehrana rakavega bolnika • Cistična fibroza • Prehrana pri redkih genetskih in metabolnih boleznih <p>Etika in prehrana</p> <p>Spretnosti dobrega prehranskega svetovanja</p>	<p>Anthropometrical measurements, indices and measurements of body composition and the use of normative</p> <p>Methods for assessment of dietary intake:</p> <ul style="list-style-type: none"> - 24-hour Dietary Recall (24-hr) - Estimated/Weighted Food Record - Paper based-Dietary Records - Electronic based-Dietary Records - Food Frequency Methods, FFQ <p>Use of computer programs to calculate and evaluate the dietary intake (Prodi Expert plus Germany; Open Platform for Clinical Nutrition, OPKP).</p> <p>Comparison of energy and nutrients intake to dietary recommendations (D-A-CH reference values for nutrient intake, ESPGHAN, ESPEN WHO) and interpretation of the results.</p> <p>Organization of kinder garden and school meals as well as meals in restaurants and canteens for adults (included homes for elderly people)</p> <p>Nutritional care plan</p> <p>Nutritional support and therapy</p> <p>Monitoring the effects of nutritional care and therapy</p> <p>Documentation</p> <p>Clinical nutrition in different disease states in population:</p> <ul style="list-style-type: none"> • Paediatric clinical nutrition • Over/Malnutrition • Metabolic syndrome • Eating disorders • Allergies • Intolerances • Failure of different organs • Nutrition in intensive care • Nutrition support of patients with cancer • Cystic fibrosis • Nutrition in rare genetic and metabolic diseases <p>Ethics and nutrition</p> <p>Counselling skills for dietitians</p>
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Temeljna literatura in viri/Readings:

1. [Elia, M.](#), Ljungqvist, O., [Stratton, R.](#), [Lanham-New, S.](#) 2013. Clinical nutrition. 2. izd. Chichester: Wiley Blackwell.
2. Lawrence, J., Douglas, P., Webster-Gandy, J. 2016. Dietetic and nutrition case studies; knjiga; Chichester: Wiley Blackwell.
3. Webster-Gandy, J. 2014. Manual of dietetic practice. 5. izd. Chichester: John Wiley & Sons
4. Rolfes, S.R., Pinna, K., Whitney, E.N. 2006. Understanding normal and clinical nutrition. 7. izd. Belmont : Thomson/Wadsworth.
5. Garrow J.S., James W. P. T., Ralph A. 2000. Human nutrition and dietetics. 10. izd. Edinburgh, C. Livingstone.
6. Escott-Stump S. 1998. Nutrition and diagnosis-related care. 4. izd. Baltimore, Williams & Wilkins.

Cilji in kompetence:

Slušatelj spozna kaj je prehranski status in na podlagi katerih parametrov se ocenijo prehranske potrebe posameznika. Razume, da so prehranske potrebe posameznika odvisne od njegovega presnovnega in

Objectives and competences:

A student learns what the nutritional status is and based on which parameters the nutritional needs of an individual is assessed. She/he understands that the nutritional needs of an individual depend on the

<p>prehranskega stanja, starosti (rast) in telesne aktivnosti ter samega bolezenskega stanja. Na osnovi prehranske obravnave zna predvideti prehranske potrebe po energiji, makro- in mikrohranilih bolnika.</p> <p>Razume pojem prehranske ogroženosti, predvsem hospitaliziranih bolnikov, in pozna uporabo presejalnih testov v klinični praksi.</p> <p>Pozna prednosti in slabosti različnih metod za ugotavljanje prehranskega vnosa in jih zna uporabljati.</p> <p>Pozna osnovne antropometričnih meritev ter metod za ugotavljanje sestave telesa.</p> <p>Zna izdelati individualni plan prehranske podpore in terapije pri določenih skupinah bolnikov (alergije, intolerance, diabetes, kronična vnetna črevesna bolezen, ledvična odpoved, ...).</p> <p>Zna spremljati učinke prehranske obravnave in ustrezno prilagajati prehransko podporo in terapijo.</p> <p>Nauči se osnovne komunikacije s pacienti in osnovnih načel etike.</p>	<p>metabolic and nutritional status, age (growth), activity level and clinical condition (type of disease etc.). Based on nutritional evaluation, she/he is able to foresee the nutritional needs for energy, macro- and micronutrients of a patient.</p> <p>He/she understands the concept of nutritional vulnerability, especially hospitalized patients, and is familiar with the use of screening tests in clinical practice.</p> <p>He/she knows the strengths and weaknesses of different methods for determining the dietary intake and knows how to use them.</p> <p>He/she knows the basic of anthropometric measurements and methods for determination of body composition.</p> <p>He/she is capable of creating the individual nutritional support and therapy plan for the patient, especially those who have allergies, intolerances, diabetes and irritable bowel disease and others.</p> <p>He/she knows how to monitor the effect of nutritional evaluation and to adapt the nutrition support and therapy based on the patient's needs.</p> <p>He/she knows the basic communication skills with the patient and the basic of ethics.</p>
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<p>Predvideni študijski rezultati:</p> <p>Znanje in razumevanje: Pridobljeno znanje bo slušatelju omogočilo, da bo znal prepoznati prehransko ogrožene posameznike in bolnike, opredeliti njihovo presovno stanje ter pripraviti okvirni plan prehranske podpore. Razumel bo posamezna bolezenska stanja, kjer ima pri zdravljenju oziroma obvladovanju boleznih prehrana pomembno vlogo (alergije, intolerance, diabetes, ipd.).</p>	<p>Intended learning outcomes:</p> <p>Knowledge and understanding: The acquired knowledge will enable the student to recognize individuals or patients with the risk for malnutrition, to assess their metabolic status and prepare the informative plan for nutritional support. The student will be able understand the role of nutrition/diet in the maintenance some specific diseases (allergies, intolerances, diabetes, etc.)</p>
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<p>Metode poučevanja in učenja:</p> <p>Predavanja, projektno-seminarsko delo in diskusije. Prisotnost pri seminarjih je obvezna.</p>	<p>Learning and teaching methods:</p> <p>Lectures, project-seminar work and discussions. Attendance at seminars is obligatory.</p>
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Načini ocenjevanja:	Delež/Weight	Assessment:
Pisni izpit	60,00 %	Written exam
Zaključno delo	40,00 %	Final work

<p>Ocenjevalna lestvica:</p> <p>5 - 10, pri čemer velja, da je pozitivna ocena od 6 - 10</p>	<p>Grading system:</p> <p>5 - 10, a student passes the exam if he is graded from 6 to 10</p>
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<p>Reference nosilca/Lecturer's references:</p> <p>Evgen Benedik</p> <p>1. ŠTANGAR, Maruša, ŠTANGAR, Anja, SHTYRBAE, Volha, CIGIĆ, Blaž, BENEDIK, Evgen. Rapid weight loss among elite-level judo athletes: methods and nutrition in relation to competition performance. Journal of the International Society of Sports Nutrition. [Online ed.]. 2022, vol. 19, no. 1, str. 380-396, ilustr. ISSN 1550-2783. https://www.tandfonline.com/doi/full/10.1080/15502783.2022.2099231, DOI: 10.1080/15502783.2022.2099231.</p>
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2. ANDRONIKOV, Darko, KUZELOV, Aco, BENEDIK, Evgen, SAZDOVA, Julijana, MOJSOV, Kiro, JANEVSKI, Aco, JORDEVA, Sonja, GOLOMEOVA LONGUROVA, Saška. Chemical characteristic [i. e. characteristics] of rabbit hibrids [i. e. hybrids]. Journal of agriculture and plant sciences : JAPS. 2021, vol. 19, no. 1, str. 9-15. ISSN 2545-4447. <https://js.ugd.edu.mk/index.php/YFA/article/view/4267/3829>, DOI: 10.46763/JAPS21191009a.
3. URLEP ŽUŽEJ, Darja, BENEDIK, Evgen, BRECELJ, Jernej, OREL, Rok. Partial enteral nutrition induces clinical and endoscopic remission in active pediatric Crohn's disease : results of a prospective cohort study. European journal of pediatrics. 2020, vol. 179, str. 431-438. ISSN 0340-6199. DOI: 10.1007/s00431-019-03520-7.
4. VELKAVRH, Manca, PARO PANJAN, Darja, BENEDIK, Evgen, FIDLER MIS, Nataša, GODNOV, Uroš, SOLTIROVSKA ŠALAMON, Aneta. The influence of maternal levels of vitamin D and adiponectin on anthropometrical measures and bone health in offspring. Prilozi. [Print]. 2019, vol. 40, iss 3, str. 91-98, ilustr. ISSN 1857-9345. http://manu.edu.mk/prilozi/40_3/8.pdf.
5. OREL, Anija, HOMAN, Matjaž, BLAGUS, Rok, BENEDIK, Evgen, OREL, Rok, FIDLER MIS, Nataša. Nutrition of patients with severe neurologic impairment. Radiology and oncology. [Print ed.]. 2018, vol. 52, no. 1, str. 83-89, vi, graf. prikazi. ISSN 1318-2099. DOI: 10.1515/raon-2017-0060.
6. BENEDIK, Evgen. Sources of vitamin D for humans. International journal for vitamin and nutrition research. 2022, vol. 92, iss. 2, str. 118-125, ilustr. ISSN 0300-9831. DOI: 10.1024/0300-9831/a000733.

KOLOIDI

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Koloidi
Course title:	Colloids
Članica nosilka/UL Member:	UL FE

Študijski programi in stopnja	Študijska smer	Letnik	Semestri	Izbirnost
Bioznanosti, tretja stopnja, doktorski	Ni členitve (študijski program)		Celoletni	izbirni

Univerzitetna koda predmeta/University course code:	0037320
Koda učne enote na članici/UL Member course code:	3822

Predavanja /Lectures	Seminar /Seminar	Vaje /Tutorials	Klinične vaje /Clinical tutorials	Druge oblike študija /Other forms of study	Samostojno delo /Individual student work	ECTS
10	15	0	0	15	85	5

Nosilec predmeta/Lecturer: Tomaž Urbič

Izvajalci predavanj: Ksenija Kogej, Tomaž Urbič

Izvajalci seminarjev:

Izvajalci vaj:

Izvajalci kliničnih vaj:

Izvajalci drugih oblik:

Izvajalci praktičnega usposabljanja:

Vrsta predmeta/Course type: teoretični/theoretical

Jeziki/Languages:	Predavanja/Lectures:	Angleščina, Slovenščina
	Vaje/Tutorial:	Angleščina, Slovenščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisites:
splošni pogoji za vpis na doktorski študij	general conditions for enrolment in doctoral studies

Vsebina:	Content (Syllabus outline):
<p>Uvod. Klasifikacija koloidnih sistemov. Vrste medfaznih površin in pojavi na njih. Kinetične in optične lastnosti koloidov. Dinamika v koloidnih sistemih. Medmolekulske interakcije in tvorba urejenih struktur.</p> <p>Koloidi. Vrste koloidov. Sile med koloidnimi delci in njihov vpliv na stabilnost. Sterična in elektrostatska stabilizacija koloidov. Vpliv polimerov na stabilnost</p>	<p>Introduction. Classification of colloid systems. Types of interfaces and interfacial phenomena. Kinetic and optical properties of colloids. Dynamics in colloid systems. Intermolecular interactions and formation of ordered structures.</p> <p>Colloids. Types of colloids. Forces between colloidal particles. Steric and electrostatic stabilisation of colloids. Influence of polymers on the stability of colloids. Kinetic of coagulation. Thermodynamics of</p>

<p>koloidov. Kinetika koagulacije. Termodinamika koagulacije in kritična temperatura flokulacije. Praktični primeri koloidnih sistemov (na primer mleko, glina, barve, razne farmacevtske oblike, biološke membrane, itd.).</p> <p>Polimeri. Konformacija verige, polidisperznost. Polimeri v raztopinah. Polimerne zmesi in blok-kopolimeri. Polielektroliti. Karakterizacija polimerov s sipanjem svetlobe.</p> <p>Amfifili. Vrste amfifilov. Površinska aktivnost. Adsorpcija na površinah. Monomolekularne plasti. Površinsko aktivne snovi ali surfaktanti. Micelizacija in kritična micelna koncentracija. Termodinamika nastanka micel. Hidrofobni efekt. Delovanje detergentov. Solubilizacija. Ukrivljenost površin in njena povezava z obliko asociiranih struktur.</p> <p>Izbrani primeri koloidnih struktur. Mikro in makro emulzije. Tekoči kristali. Biološki koloidi (lipidne membrane, DNA, proteini, polisaharidi in glikoproteini). Združevanje makromolekul (mikrotubule in nitaste strukture). Poudarek na raziskovalni tematiki študenta.</p>	<p>coagulation and critical flocculation temperature. Practical examples of colloid systems (e.g. milk, clays, colours, various pharmaceutical forms, biological membranes, etc.).</p> <p>Polymers. Chain conformation, polydispersity. Polymers in solutions. Polymer mixtures and block-copolymers. Polyelectrolytes. Characterisation of polymers by light scattering.</p> <p>Amphiphiles. Types of amphiphiles. Surface activity. Adsorption at surfaces. Monomolecular layers. Micellization and critical micelle concentration. Thermodynamic of micellization. Hydrophobic effect. Detergency. Solubilisation. Surfaces curvature and its connection to the form of associated structures.</p> <p>Selected examples of colloidal structures. Micro- and macro-emulsions. Liquid crystals. Biological colloids (lipid membranes, DNA, proteins, polysaccharides and glycoproteins). Association of macromolecules (microtubules and thread-like structures). Stress is on the research subject of the student.</p>
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Temeljna literatura in viri/Readings:

<ul style="list-style-type: none"> • Ksenija Kogej: Površinska in koloidna kemija, 2. izd. Ljubljana: Fakulteta za kemijo in kemijsko tehnologijo, 2015. IX, 185 str., ilustr. ISBN 978-961-6756-56-3. [COBISS.SI-ID 276930560] • Ian W. Fleming: <i>Introduction to Soft Matter. Synthetic and Biological Self-Assembling Materials</i>, Revised Edition, John Wiley & Sons, Ltd., Chichester, 2007. • Bo Jönsson, Björn Lindman, Krister Holmberg, Bengt Kronberg: <i>Surfactants and Polymers in Aqueous Solution</i>, John Wiley & Sons, Chichester, 1998. • D. Fennell Evans, H. Wenerstrom: <i>The Colloidal Domain: Where Physics, Chemistry and Biology Meet</i>, 2nd Edition, Wiley-VCH, New York, 1999. <p>Revijalni članki s področja, tekoča periodika s področja raziskovanega dela študenta, druga učna gradiva.</p>
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Cilji in kompetence:

<p>Cilj predmeta je študenta seznaniti s sistemi, ki vsebujejo delce koloidnih dimenzij (npr. polimere, amfifile, surfaktante, lipide oz. splošno delce koloidnih dimenzij) in z zakonitostmi, ki določajo njihove lastnosti, stabilnost ter strukturo oz. urejenost. Študent se seznanja z velikim pomenom površine (medfazne meje) v koloidnih sistemih in približno znanje za prepoznavanje in razumevanje značilnih pojavov, ki so s tem povezani. To je tudi osnova za to, da bodo znali vplivati na lastnosti koloidnih sistemov.</p>	<p>Objectives and competences:</p> <p>The aim of the subject is to acquaint the student with systems containing particles of colloid dimensions (e.g., polymers amphiphiles, surfactants, lipids or generally colloid particles) and with basic principles that define their properties, stability and structure or ordering. Students are acquainted with the importance of surfaces (interfaces) in colloidal systems and acquire knowledge to recognise and understand the related phenomena, which is also the basis to manipulate with properties of colloidal systems.</p>
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Predvideni študijski rezultati:

<p><i>Znanje in razumevanje:</i> S pridobljenim znanjem bo študent razumel pojave v kompleksnih koloidnih sistemih, ki jih bo srečeval pri svojem strokovnem in raziskovalnem delu. Naučil se bo vrednotiti stabilnost in uporabiti ustrezne metode za proučevanje lastnosti koloidnih sistemov.</p> <p><i>Uporaba:</i></p>	<p>Intended learning outcomes:</p> <p><i>Knowledge and understanding:</i> The acquired knowledge enables the student to understand complex phenomena in colloid systems encountered in her/his research work. The student learns to appreciate stability of colloidal systems and the appropriate methods for studying their properties.</p> <p><i>Application:</i></p>
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<p>Študent bo sposoben reševati zelo različne probleme s področja nanotehnologije in nanobiologije, eksperimentalna opažanja in rezultate svojega raziskovalnega dela bo zmožen interpretirati na molekularnem nivoju. Hkrati mu bo znanje koristilo pri načrtovanju razvoja novih materialov, pri razumevanju bioloških procesov in pri razvoju novih farmacevtskih oblik ter pri podobnih nalogah.</p> <p><i>Refleksija:</i> Na osnovi pridobljenega znanja se bo študent zavedal tesne povezave med strukturo in sestavo polimerov, amfifilov ter koloidov in njihovimi lastnostmi v praktičnih sistemih.</p> <p><i>Prenosljive spretnosti:</i> Način reševanje problemov, povezanih s koloidi, in predstavljene eksperimentalne metode so uporabne na raznih naravoslovnih področjih, od kemije in fizike do biologije, medicine in farmacije, pa tudi na mnogih tehnoloških področjih.</p>	<p>The course provides students with a good basis for solving various problems in the field of nanotechnology and nanobiology and for the interpretation of experimental results on molecular level. The acquired knowledge helps the student in designing new materials, in understanding biological processes, in developing novel pharmaceutical formulations and in similar tasks.</p> <p><i>Reflection:</i> The student becomes aware of the close relation between structure and composition of polymers, amphiphiles, and colloids and their properties in practical systems.</p> <p><i>Transferable skills:</i> Principle of solving problems related to colloids and the introduced experimental techniques can be profitably used in various fields of natural sciences, from chemistry and physics to biology, medicine and pharmacy, and also in various technological fields.</p>
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Metode poučevanja in učenja:

<p>-predavanja; -izdelava projekta, ki se navezuje na raziskovalno delo študenta. Projekt študenti izdelujejo sproti v obliki obveznih domačih nalog in ga dokončajo po izteku predavanj. Pri izpeljavi jim je zagotovljeno individualno spremljanje in pomoč; -predstavitve projekta v pisni obliki in ustno pred skupino študentov</p>	<h4>Learning and teaching methods:</h4> <p>-lectures; -students will work on a project related to their research. The project will be done concurrently with the lectures in the form of compulsory homework and completed after the lectures are over. Students may discuss the development of the project with the lecturer. -presentation of the project in written and oral form (in front of the fellow students).</p>
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Načini ocenjevanja:

Delež/Weight

Assessment:

Dokončanje in predstavitve projekta	50,00 %	Completion and presentation of the project
Ustni izpit	50,00 %	Oral exam

Ocenjevalna lestvica:

Grading system:

5 - 10, pri čemer velja, da je pozitivna ocena od 6 - 10	5 - 10, a student passes the exam if he is graded from 6 to 10
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Reference nosilca/Lecturer's references:

Tomaž Urbič:

- MIJIN, Nemanja, MILOŠEVIĆ, Jelica, STEVANOVIC, Sanja, PETROVIĆ, Predrag, LOLIĆ, Aleksandar, **URBIČ, Tomaž**, POLOVIĆ, Natalija Đ. Amyloid-like aggregation influenced by lead(II) and cadmium(II) ions in hen egg white ovalbumin. *Food hydrocolloids*. [Print ed.]. Mar. 2023, vol. 136, pt. b, str. 1-12, ilustr. ISSN 0268-005X.
<https://www.sciencedirect.com/science/article/abs/pii/S0268005X22008128>, DOI: [10.1016/j.foodhyd.2022.108292](https://doi.org/10.1016/j.foodhyd.2022.108292). [COBISS.SI-ID [129044483](https://www.cobiss.si/urn:nbn:si:coi:10-129044483)]
- HLELI, Belhssen, MEDOŠ, Žiga, OGRIN, Peter, TOŠNER, Zdeněk, KEREÏCHE, Sami, GRADZIELSKI, Michael, **URBIČ, Tomaž**, BEŠTER-ROGAČ, Marija, MATĚJÍČEK, Pavel. Closo-dodecaborate-based dianionic surfactants with distorted classical morphology : synthesis and atypical micellization in water. *Journal of colloid and interface science*. 15 Oct. 2023, vol. 648, str. 809-819, ilustr. ISSN 0021-9797. <https://www.sciencedirect.com/science/article/pii/S0021979723010330>, <https://repozitorij.uni-lj.si/IzpisGradiva.php?id=147049>, DOI: [10.1016/j.jcis.2023.06.013](https://doi.org/10.1016/j.jcis.2023.06.013). [COBISS.SI-ID [156408323](https://www.cobiss.si/urn:nbn:si:coi:10-156408323)]
- JÓZWIAK, Kinga, OGRIN, Peter, **URBIČ, Tomaž**, FILAROWSKI, Aleksander. Molecular dynamics and density functional theory studies of conformational stability of bilirubin and biliverdin. *Journal of*

molecular liquids. [Print ed.]. 1 Dec. 2023, vol. 391, pt. a, [article no.] 123287, str. 1-7, ilustr. ISSN 0167-7322. <https://www.sciencedirect.com/science/article/pii/S0167732223020937>. [COBISS.SI-ID 168580867]

4. MEDOŠ, Žiga, HLELI, Belhssen, TOŠNER, Zdeněk, OGRIN, Peter, **URBIČ, Tomaž**, KOGEJ, Ksenija, BEŠTER-ROGAČ, Marija, MATĚJÍČEK, Pavel. Counterion-induced aggregation of metallacarboranes. *The journal of physical chemistry. C, Nanomaterials and interfaces*. [Print ed.]. 31 Mar. 2022, vol. 126, iss. 12, str. 5735-5742, ilustr. ISSN 1932-7447. <https://pubs.acs.org/doi/10.1021/acs.jpcc.2c00107>, <https://repozitorij.uni-lj.si/IzpisGradiva.php?id=136960>, DOI: [10.1021/acs.jpcc.2c00107](https://doi.org/10.1021/acs.jpcc.2c00107). [COBISS.SI-ID 102266627]
5. HUBMAN, Anže, PLAZL, Igor, **URBIČ, Tomaž**. Inertial focusing of neutrally buoyant particles in heterogenous suspensions. *Journal of molecular liquids*. [Print ed.]. 15 Apr. 2021, vol. 328, str. 1-7, ilustr. ISSN 0167-7322. <https://www.sciencedirect.com/science/article/abs/pii/S0167732221001367>, <https://repozitorij.uni-lj.si/IzpisGradiva.php?id=127171>, DOI: [10.1016/j.molliq.2021.115410](https://doi.org/10.1016/j.molliq.2021.115410). [COBISS.SI-ID 48091395]
6. **URBIČ, Tomaž**, DIAS, Cristiano L. Thermodynamic properties of amyloid fibrils : a simple model of peptide aggregation. *Fluid phase equilibria*. [Print ed.]. 15 Jun. 2019, vol. 489, str. 104-110, ilustr. ISSN 0378-3812. <https://www.sciencedirect.com/science/article/pii/S0378381219300445>, DOI: [10.1016/j.fluid.2019.02.002](https://doi.org/10.1016/j.fluid.2019.02.002). [COBISS.SI-ID 1538132675]

Ksenija Kogej

1. ROMOLO, Anna, JAN, Zala, BEDINA ZAVEC, Apolonija, KISOVEC, Matic, ARRIGLER, Vesna, SPASOVSKI, Vesna, PODOBNIK, Marjetka, IGLIČ, Aleš, POCSFALVI, Gabriella, **KOGEJ, Ksenija**, KRALJ-IGLIČ, Veronika. Assessment of small cellular particles from four different natural sources and liposomes by interferometric light microscopy. *International journal of molecular sciences*. 2022, vol. 23, no. 24, str. 1-22, ilustr. ISSN 1422-0067. <https://www.mdpi.com/1422-0067/23/24/15801>, DOI: [10.3390/ijms232415801](https://doi.org/10.3390/ijms232415801). [COBISS.SI-ID 136801795]
2. MEDOŠ, Žiga, HLELI, Belhssen, TOŠNER, Zdeněk, OGRIN, Peter, **URBIČ, Tomaž**, **KOGEJ, Ksenija**, BEŠTER-ROGAČ, Marija, MATĚJÍČEK, Pavel. Counterion-induced aggregation of metallacarboranes. *The journal of physical chemistry. C, Nanomaterials and interfaces*. [Print ed.]. 31 Mar. 2022, vol. 126, iss. 12, str. 5735-5742, ilustr. ISSN 1932-7447. <https://pubs.acs.org/doi/10.1021/acs.jpcc.2c00107>, DOI: [10.1021/acs.jpcc.2c00107](https://doi.org/10.1021/acs.jpcc.2c00107). [COBISS.SI-ID 102266627].
3. BOŽIČ, Darja, HOČEVAR, Matej, JERAN, Marko, KISOVEC, Matic, BEDINA ZAVEC, Apolonija, ROMOLO, Anna, ŠKUFGA, David, PODOBNIK, Marjetka, **KOGEJ, Ksenija**, IGLIČ, Aleš, TOUZET, Nicolas, MANNO, Mauro, POCSFALVI, Gabriella, BONGIOVANNI, Antonella, KRALJ-IGLIČ, Veronika. Ultrastructure and stability of cellular nanoparticles isolated from *Phaeodactylum tricornutum* and *Dunaliella tertiolecta* conditioned media. *Open research Europe*. 2022, vol. 2, str. 1-14, ilustr. ISSN 2732-5121. <https://open-research-europe.ec.europa.eu/articles/2-121>, DOI: [10.12688/openreseurope.14896.1](https://doi.org/10.12688/openreseurope.14896.1). [COBISS.SI-ID 136845315]
4. **KOGEJ, Ksenija**, BOŽIČ, Darja, KOBAL, Borut, HERZOG, Maruša, ČERNE, Katarina. Application of dynamic and static light scattering for size and shape characterization of small extracellular nanoparticles in plasma and ascites of ovarian cancer patients. *International journal of molecular sciences*. 2021, vol. 22, iss. 23, str. 1-23, ilustr. ISSN 1422-0067. <https://www.mdpi.com/1422-0067/22/23/12946>, DOI: [10.3390/ijms222312946](https://doi.org/10.3390/ijms222312946). [COBISS.SI-ID 87267843].
5. BOŽIČ, Darja, SITAR, Simona, JUNKAR, Ita, ŠTUKELJ, Roman, PAJNIČ, Manca, ŽAGAR, Ema, KRALJ-IGLIČ, Veronika, **KOGEJ, Ksenija**. Viscosity of plasma as a key factor in assessment of extracellular vesicles by light scattering. *Cells*. Sep. 2019, vol. 8, iss. 9, str. 1-21, ilustr. ISSN 2073-4409. <https://www.mdpi.com/2073-4409/8/9/1046>, DOI: [10.3390/cells8091046](https://doi.org/10.3390/cells8091046). [COBISS.SI-ID 1538312131].
6. HRIBERŠEK, Patricija, **KOGEJ, Ksenija**. Tacticity and counterion modulated temperature response of weak polyelectrolytes: the case of poly(methacrylic acid) stereoisomers in aqueous solutions. *Macromolecules*. 24 Sep. 2019, vol. 52, iss. 18, str. 7028-7041, ilustr. ISSN 0024-9297. <https://pubs.acs.org/doi/10.1021/acs.macromol.9b01467>, DOI: [10.1021/acs.macromol.9b01467](https://doi.org/10.1021/acs.macromol.9b01467). [COBISS.SI-ID 1538320323].

KORELATIVNA MIKROSKOPIJA

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Korelativna mikroskopija
Course title:	Correlative microscopy
Članica nosilka/UL	UL BF
Member:	

Študijski programi in stopnja	Študijska smer	Letnik	Semestri	Izbirnost
Bioznanosti, tretja stopnja, doktorski	Ni členitve (študijski program)		Celoletni	izbirni

Univerzitetna koda predmeta/University course code:	0037356
Koda učne enote na članici/UL Member course code:	3859

Predavanja /Lectures	Seminar /Seminar	Vaje /Tutorials	Klinične vaje /Clinical tutorials	Druge oblike študija /Other forms of study	Samostojno delo /Individual student work	ECTS
10	20	0	0	15	80	5

Nosilec predmeta/Lecturer: Mateja Erdani Kreft

Izvajalci predavanj: Mateja Erdani Kreft
Izvajalci seminarjev:
Izvajalci vaj:
Izvajalci kliničnih vaj:
Izvajalci drugih oblik:
Izvajalci praktičnega usposabljanja:

Vrsta predmeta/Course type: teoretični/theoretical

Jeziki/Languages:
Predavanja/Lectures: Angleščina, Slovenščina
Vaje/Tutorial:

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:
Splošni pogoji za vpis na doktorski študij

Prerequisites:
General prerequisites for doctoral studies

Vsebina:

- Korelativna mikroskopija in podroben vpogled v zgradbo in delovanje iste celice.
- Spremljanje istih celičnih procesov v času in prostoru z ločljivostjo svetlobne fluorescenčne mikroskopije ter elektronske mikroskopije.
- Označevalci v korelativni mikroskopiji.
- Predstavitve in uporaba različnih tehnik v korelativni mikroskopiji (od celic do mikroskopiranja in končne analize slike).

Content (Syllabus outline):

- Correlative microscopy with detailed insight into the structure and function of the same cells.
- Simultaneous observation of a given subcellular structure and cellular processes from the micron to the nanometer scale while maintaining spatial orientation.
- Labelling markers in correlative microscopy.
- Introduction to the different correlative microscopy approaches and their applications.

<ul style="list-style-type: none"> • Pravilna izbira posameznih tehnik v korelativni mikroskopiji: prednosti in slabosti. • Praktični prikaz metod korelativne mikroskopije za opazovanje in analizo istih področij znotraj celice. 	<ul style="list-style-type: none"> - The correct selection of the particular correlative microscopy approaches: their advantages and disadvantages. Demonstration of the correlative microscopy from the methods of culturing the cells, methods in light and electron microscopy to the semi/fully automated sample analyses.
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Temeljna literatura in viri/Readings:

<ul style="list-style-type: none"> • Correlative Light and Electron Microscopy IV, 2021, Volume 162 (Methods in Cell Biology), Thomas Mueller-Reichert (Editor), Paul Verkade (Editor), pages 2-430. <p>Najnovejši pregledni in raziskovalni članki s področja korelativne mikroskopije /The latest review and research articles from the field of correlative microscopy.</p>

Cilji in kompetence:

<ul style="list-style-type: none"> • Pridobivanje specialnih znanj s področja korelativne mikroskopije. • Poznavanje in razumevanje metod svetlobne in elektronske mikroskopije za opazovanje in analizo istih področij znotraj celice. 	<h3>Objectives and competences:</h3> <ul style="list-style-type: none"> • Acquiring of special knowledge on correlative microscopy. • To learn and understand the correlative microscopy for observation and analysis of the same areas within the cell.
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Predvideni študijski rezultati:

<p>Znanje in razumevanje:</p> <ul style="list-style-type: none"> • Praktična znanja za analizo ultrastrukture in delovanja celic s pomočjo korelativne mikroskopije. • Izbira ustreznih metod v korelativni mikroskopiji za raziskave v celični biologiji. 	<h3>Intended learning outcomes:</h3> <p>Knowledge and understanding:</p> <ul style="list-style-type: none"> • Practical knowledge to analyse cell ultrastructure and function using correlative microscopy. • Choosing of appropriate methodology of correlative microscopy for applications in cell biology studies.
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Metode poučevanja in učenja:

<p>Predavanja, konzultacije, praktične demonstracije, seminarji in individualno projektno delo.</p>	<h3>Learning and teaching methods:</h3> <p>Lectures, consultations, practical demonstrations, seminars and individual project.</p>
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Načini ocenjevanja:

	Delež/Weight	Assessment:
Projektno/seminarsko delo in ustno izpraševanje	100,00 %	Project/essay work and oral answers to questions.

Ocenjevalna lestvica:

5 - 10, pri čemer velja, da je pozitivna ocena od 6 - 10	<h3>Grading system:</h3> <p>5 - 10, a student passes the exam if he is graded from 6 to 10</p>
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Reference nosilca/Lecturer's references:

<p>Mateja Erdani Kreft SUŠNIK BAJEC, Simona, DJURDJEVIČ, Ida, LINARES ANDÚJAR, Carmen, ERDANI-KREFT, Mateja. Genetic and correlative light and electron microscopy evidence for the unique differentiation pathway of erythrocytes in brown trout skin. Scientific reports. 19 jan. 2022, vol. 12, art. no 1015, str. 1-15, ilustr. ISSN 2045-2322. https://www.nature.com/articles/s41598-022-04799-7, DOI: 10.1038/s41598-022-04799-7. [COBISS.SI-ID 94290179]</p> <p>RESNIK, Nataša, BARAGA, Diana, GLAŽAR, Polona, ZEMLJIČ JOKHADAR, Špela, DERGANČ, Jure, SEPCIC, Kristina, VERANIC, Peter, ERDANI-KREFT, Mateja. Molecular, morphological and functional properties of tunnelling nanotubes between normal and cancer urothelial cells : new insights from the in vitro model mimicking the situation after surgical removal of the urothelial tumor. Frontiers in cell and developmental biology. 2022, vol. 10, str. 1-20, ilustr. ISSN 2296-634X. https://doi.org/10.3389/fcell.2022.934684, DOI: 10.3389/fcell.2022.934684. [COBISS.SI-ID 135025923]</p>

KURET, Tadeja, PESKAR, Dominika, **ERDANI-KREFT, Mateja**, ERMAN, Andreja, VERANIČ, Peter. Comprehensive transcriptome profiling of urothelial cells following TNF α stimulation in an in vitro interstitial cystitis/bladder pain syndrome model. *Frontiers in immunology*. Aug. 2022, vol. 13, str. 1-16, ilustr. ISSN 1664-3224. <https://www.frontiersin.org/articles/10.3389/fimmu.2022.960667/full>, DOI: 10.3389/fimmu.2022.960667. [COBISS.SI-ID 118210307]

ERDANI-KREFT, Mateja, MIRONOV, Alexander A., HUDOKLIN, Samo. The Golgi complex : an organelle that determines urothelial cell biology in health and disease. *Histochemistry and cell biology*. Sep. 2022, vol. 158, iss. 3, str. 229-240, ilustr. ISSN 0948-6143. <https://link.springer.com/content/pdf/10.1007/s00418-022-02121-0.pdf>, DOI: 10.1007/s00418-022-02121-0. [COBISS.SI-ID 115936003]

MA, Guanglong, KOSTEVŠEK, Nina, MARKELC, Boštjan, HUDOKLIN, Samo, **ERDANI-KREFT, Mateja**, SERŠA, Igor, ČEMAŽAR, Maja, MARKOVIĆ, Katarina, ŠČANČAR, Janez, et al. PD1 blockade potentiates the therapeutic efficacy of photothermally-activated and MRI-guided low temperature-sensitive magnetoliposomes. *Journal of controlled release*. [Print ed.]. 2021, vol. 332, str. 419-433, ilustr. ISSN 0168-3659. DOI: 10.1016/j.jconrel.2021.03.002. [COBISS.SI-ID 54376707]

TRATNJEK, Larisa, SIBINOVSKA, Nadica, KRISTAN, Katja, **ERDANI-KREFT, Mateja**. In vitro ciliotoxicity and cytotoxicity testing of repeated chronic exposure to topical nasal formulations for safety studies. *Pharmaceutics*. [Online ed.]. 2021, vol. 13, iss. 11, str. 1-20, ilustr. ISSN 1999-4923. <https://www.mdpi.com/1999-4923/13/10/1739>, DOI: 10.3390/pharmaceutics13111750. [COBISS.SI-ID 81714179] their differentiation stage. *Differentiation*, ISSN 0301-4681, 2009, letn. 77, št. 1, str. 48-59, doi: 10.1016/j.diff.2008.09.011. [COBISS.SI-ID 25479641]

KRITERIJI VARNOSTI

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Kriteriji varnosti
Course title:	Safety criteria
Članica nosilka/UL Member:	UL FS

Študijski programi in stopnja	Študijska smer	Letnik	Semestri	Izbirnost
Bioznanosti, tretja stopnja, doktorski	Ni členitve (študijski program)		Celoletni	izbirni

Univerzitetna koda predmeta/University course code:	0037330
Koda učne enote na članici/UL Member course code:	3833

Predavanja /Lectures	Seminar /Seminar	Vaje /Tutorials	Klinične vaje /Clinical tutorials	Druge oblike študija /Other forms of study	Samostojno delo /Individual student work	ECTS
10	25	0	0	10	80	5

Nosilec predmeta/Lecturer: Boris Jerman

Izvajalci predavanj:	Boris Jerman
Izvajalci seminarjev:	
Izvajalci vaj:	
Izvajalci kliničnih vaj:	
Izvajalci drugih oblik:	
Izvajalci praktičnega usposabljanja:	

Vrsta predmeta/Course type: teoretični/theoretical

Jeziki/Languages:	Predavanja/Lectures:	Angleščina, Slovenščina
	Vaje/Tutorial:	Angleščina, Slovenščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisites:
Splošni pogoji za vpis na doktorski študij.	General conditions for enrolment in doctoral studies.

Vsebina: V okviru predmeta bo podrobno pojasnjen koncept zagotavljanja varnosti in zdravja pri delu, kar vključuje tudi komponente varovanja okolja. Opisani bodo parametri, ki vplivajo na zagotavljanje varnosti. Razložena bosta koncepta vgrajene in dodana varnost. Definiran bo pojem tveganje in obrazloženi njegovi elementi. Predstavljene bodo tipične nevarnosti, ki se lahko pojavijo pri delu s stroji. Obravnavane bodo varnostne analize, s pomočjo	Content (Syllabus outline): The main framework of the course is the concepts of safety and health assurance at work and of environmental protection. Influential parameters will be presented and described. The concepts of built-in and add-on safety will be introduced. The concept of risk will be defined and its elements will be described in detail. Typical hazards that can be present during work with machinery will be described. Safety analysis for determining the levels of risk will be treated.
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<p>katerih se določajo nivoji tveganja. Slušatelji bodo spoznali varnostne naprave in sisteme, vključno z osnovnimi varnostnimi krmilji, ki se uporabljajo pri zagotavljanju ustrezne varnosti. Predstavljen bo pomen pravilne prostorske postavitve strojev in naprav ter posebnosti pri mobilnih strojih. Vključen bo tudi vpliv pogojev okolice na varnost pri delu s stroji (osvetljenost, hrup, temperatura, vlažnost, prah, hitrost gibanja zraka, itd.). Predstavljeni bodo tudi postopki zagotavljanja varnosti pri ročnih orodjih in strojih ter pri stacionarnih in mobilnih strojih, s poudarkom na kmetijskih, gozdarskih, lesarskih in živilsko-predelovalnih strojih. Obravnavane bodo tudi sledeče teme: metode pregledovanja in preizkušanja strojev in naprav, vpliv organizacije dela na varnost, vpliv novih tehnologij na zagotavljanje varnosti, upravljanje s tveganji. Predstavljeni bodo tudi relevantni predpisi in standardi ter primeri iz prakse. V predmet bo vključeno tudi raziskovalno delo.</p>	<p>Safety devices and systems, including basic safety circuits used for safety assurance will be introduced to the students. The importance of the correct positioning of machines in the workshop will also be introduced, together with the particularities of mobile machines. The influence of environmental conditions (light, noise, temperature, humidity, dust, airflow speed, etc.) on the safety of work with machinery will also be taken into account. Safety measures concerning work with hand-held machines will also be introduced, as will be stationary and movable machines with an emphasis on agricultural, forestry, wood-working, and food-processing machines. The following topics will also be included: methods for testing and inspecting machinery, the impact of work arrangements on safety at work, the influence of new technologies on safety assurance, risk management. The relevant regulations and standards will be introduced, together with practical examples. Research work will also be included.</p>
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Temeljna literatura in viri/Readings:

- Ridley J, Pearce D. Safety with Machinery. Oxford [etc.]: Butterworth-Heinemann, 2002;
- Hollnagel E, Safety I and Safety II. Farnham: Ashgate Publishing Company, 2014; (dostopno na DIKUL)
- Macdonald DM. Practical machinery safety. Oxford: Newnes: Burlington, 2004; (dostopno na DIKUL)
- Roger LB. Safety and Health for Engineers. New Jersey: John Wiley & Sons, 2006;
- International Labour Office. Safety and Health in Agriculture. Geneva, 2012; (dostopno na DIKUL)
- revijalni članki s področja/journal articles;
- tekoča periodika/current periodics;
- druga učna gradiva/other teaching readings.

Cilji in kompetence:

Izobraževalni cilji: Cilji predmeta so posredovati slušatelju ustrezna znanja, potrebna za razumevanje koncepta zagotavljanja varnosti. Naučiti se mora prepoznavati nevarnosti in škodljivosti ter oceniti tveganja, ki jih te nevarnosti in škodljivosti predstavljajo tako za delavca, kot tudi za okolico. Znati mora oceniti obstoječe varnostno stanje in določiti ustrezne morebitno potrebne varnostne ukrepe. Poudarek je na varnosti tehniških sistemov v biotehnikah.

Študijski rezultati: Slušatelj je po uspešno zaključenem predmetu seznanjen z ustreznimi varnostnimi kriteriji in jih zna samostojno uporabljati. Pozna elemente tveganja in metode za zniževanje tveganja.

Usposobljen je to znanje uporabiti pri zagotavljanju varnosti stroja tako med njegovim projektiranjem, kakor tudi sodelovati pri izdelavi navodil za uporabo takega stroja in pri razvijanju varnih postopkov dela. Slušatelj se zaveda nujnosti zagotavljanja varnosti na najučinkovitejši a hkrati razumen in tudi ekonomsko upravičen način. Zaveda se pomena zagotavljanja varnosti in varovanja zdravja pri delu, kakor tudi pomena varovanja okolja.

Objectives and competences:

The aim of the course is to give students the appropriate knowledge required for understanding the concept of ensuring technical safety. The students must learn how to recognize hazards and potential injury and to assess the risk which these hazards represent to workers and the environment. The students must be able to assess existing safety conditions and to determine adequate safety measures, if required. The stress is placed on the safety of biotechnical systems.

After successful conclusion of the course, the student is familiar with relevant safety criteria and he/she is capable of autonomous use of these criteria. He/she is familiar with the elements of risk and with methods of risk reduction. He/she is qualified for practical application of this knowledge for ensuring the safety of a machine during all phases of its "life", including participation in the construction phase, in writing the instructions for use, and in the development of procedures for safe work. The student is aware of the need for meeting safety requirements in the most effective but also reasonable way, also bearing in mind the economic point of view. He/she is aware of the importance of safety and health assurance at work, as well as protection of the environment.

Predvideni študijski rezultati:

Znanje in razumevanje:

Intended learning outcomes:

Knowledge and understanding:

Metode poučevanja in učenja:

Predavanja (učilnica), seminarji (individualno), konzultacije (individualno) in raziskovalno delo (individualno).

Learning and teaching methods:

Lectures (classroom), seminars (individual work), consultations (individual work) and research (individual work).

Načini ocenjevanja:**Delež/Weight****Assessment:**

Lectures (classroom), seminars (individual work),

70,00 %

Individual project – preparation,

consultations (individual work) and research (individual work)

30,00 %

presentation and oral defence

Ocenjevalna lestvica:

5 - 10, pri čemer velja, da je pozitivna ocena od 6 - 10

Grading system:

5 - 10, a student passes the exam if he is graded from 6 to 10

Reference nosilca/Lecturer's references:**Boris Jerman**

1. JERMAN, Boris, EKREN, Banu Y., KÜÇÜKYAŞAR, Melis, LERHER, Tone. Simulation-based performance analysis for a novel AVS/RS technology with movable lifts. Applied sciences. Mar. 2021, vol. 11, iss. 5, str. 1-14, ilustr. ISSN 2076-3417. <https://www.mdpi.com/2076-3417/11/5/2283#>, DOI: 10.3390/app11052283. [COBISS.SI-ID 56899843]

2. HLADNIK, Jurij, SUPEJ, Matej, VODIČAR, Janez, JERMAN, Boris. The influence of boot longitudinal flexural stiffness on external mechanical work and running economy during skate roller-skiing : a case study. Proceedings of the Institution of Mechanical Engineers. Part P, Journal of sports engineering and technology (Print). 2019, vol. 233, iss. 4, str. 548-558, ilustr. ISSN 1754-3371. <https://journals.sagepub.com/eprint/8RCERRK32DPIDFRQYFWC/full>, DOI: 10.1177/1754337119867546. [COBISS.SI-ID 16765211]

3. JERMAN, Boris, HLADNIK, Jurij, RESMAN, Franc, LANDSCHÜTZER, Christian. Optimization of the support structure of large axial-radial bearing of overhead type manipulator. FME Transactions. 2018, vol. 46, nr. 3, str. 386-391, ilustr. ISSN 1451-2092. https://www.mas.bg.ac.rs/_media/istrazivanje/fme/vol46/3/15_b_jerman_et_al.pdf. [COBISS.SI-ID 16256283]

4. HLADNIK, Jurij, JERMAN, Boris. Advanced finite element cross-country ski boot model for mass optimization directions considering flexion stiffness. Proceedings of the Institution of Mechanical Engineers. Part P, Journal of sports engineering and technology (Print). 2018, vol. 232, iss. 3, str. 264-274, ilustr. ISSN 1754-3371. <https://journals.sagepub.com/doi/abs/10.1177/1754337117745238?journalCode=pipa>, DOI: 10.1177/1754337117745238. [COBISS.SI-ID 15789083]

5. HLADNIK, Jurij, SUPEJ, Matej, JERMAN, Boris. Force measurement system for roller-ski skating. Tehnički vjesnik. Lis. 2018, vol. 25, nr. 5, f. 1291-1297, ilustr. ISSN 1848-6339. <https://hrcak.srce.hr/207425>, DOI: 10.17559/TV-20161219111250. [COBISS.SI-ID 15536923]

6. BIZJAK, Luka, HLADNIK, Jurij, JERMAN, Boris. Stress-strain analysis and optimization of universal hydraulic grapple. V: KARTNIG, Georg (ur.), ZRNIĆ, Nenad Đ. (ur.), BOŠNJAK, Srđan (ur.). MHCL 2019. XXIII International Conference on Material Handling, Constructions and Logistics, September 18th-20th, 2019, Vienna, Austria. Belgrade: Faculty of Mechanical Engineering, 2019. F. 99-104, ilustr. ISBN 978-86-6060-020-4. <http://www.mhcl.info/download/send/270-proceedings-2019/226-proceedings-mhcl-2019>. [COBISS.SI-ID 16841755]

7. ČUK, Metod, KOSEL, Franc, ZRNIĆ, Nenad Đ., JERMAN, Boris. An analysis of continuous sandwich panels with profiled faces. Strojniški vestnik. Dec. 2017, vol. 63, no. 12, str. 746-753, si 109, ilustr. ISSN 0039-2480. http://www.sv-jme.eu/?ns_articles_pdf=/ns_articles/files/ojs/4844/public/4844-25816-1-PB.pdf&id=5108, DOI: 10.5545/sv-jme.2017.4844. [COBISS.SI-ID 15799323]

KVANTITATIVNA IN STATISTIČNA GENETIKA

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Kvantitativna in statistična genetika
Course title:	Quantitative and statistical genetics
Članica nosilka/UL Member:	UL BF

Študijski programi in stopnja	Študijska smer	Letnik	Semestri	Izbirnost
Bioznanosti, tretja stopnja, doktorski	Ni členitve (študijski program)		Celoletni	izbirni

Univerzitetna koda predmeta/University course code:	0037350
Koda učne enote na članici/UL Member course code:	3853

Predavanja /Lectures	Seminar /Seminar	Vaje /Tutorials	Klinične vaje /Clinical tutorials	Druge oblike študija /Other forms of study	Samostojno delo /Individual student work	ECTS
20	45	0	0	0	185	10

Nosilec predmeta/Lecturer: Milena Kovač

Izvajalci predavanj: Milena Kovač
Izvajalci seminarjev:
Izvajalci vaj:
Izvajalci kliničnih vaj:
Izvajalci drugih oblik:
Izvajalci praktičnega usposabljanja:

Vrsta predmeta/Course type: teoretični/theoretical

Jeziki/Languages:

Predavanja/Lectures:	Angleščina, Slovenščina
Vaje/Tutorial:	Angleščina, Slovenščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Splošni pogoji za vpis na doktorski študij. Priporočljivo znanje kvantitativne in molekularne genetike, selekcije in biometrije, pridobljeno na predhodno končanih stopnjah študija.

Prerequisites:

General conditions for enrolment in doctoral studies. Knowledge of quantitative and molecular genetics, selection and biometrics obtained in previously completed study levels, is recommended.

Vsebina:

Predstavljene bodo metode genetskega spreminjanja populacij, napovedovanje in spremljanje učinkov letih tako na genetski nivo populacije kot spreminjanju strukture varianc in kovarianc. Predstavljeni bodo parametri, ki opisujejo starostno strukturo in obnovo populacije, in njihov učinek na genetske spremembe.

Content (Syllabus outline):

Methods of changing genetic structure of populations will be presented focusing on the analyses of their efficiency with respect to genetic level as well as to the covariance structure. Parameters describing age structure, replacement rate and their effect on genetic changes will be studied.

<p>Aditivni in neaditivni genetski vplivi bodo pojasnjeni s podobnostjo med osebki. Proučeni bodo vplivi, ki spreminjajo podobnost med osebki, in podane molekularno genetske metode, ki omogočajo preveritev sorodstva. Predstavljen bo koncept in metode genetskega vrednotenja. Posebej bodo izpostavljene metode selekcijskega indeksa in mešanega modela in metode največje zanesljivosti. Predstavili bomo metode in tehnike preizkusov in zbiranja informacij (vir, načini, pomen). Pri uporabljenih metodah selekcije bomo poudarili tudi pomen strukture podatkov na točnost napovedi genetskih vrednosti. Obravnavane bodo tako fenotipske kot genetske informacije o metričnih lastnostih ter njihova uporaba pri selekciji. Pozornost bo usmerjena v naključne tokove genov v majhnih populacijah, vzdrževanje genetske raznovrstnosti in rekonstrukcijo ogroženih populacij. Obravnavane bodo tudi aktualne teme, kot so npr. naključna regresija, interakcija genotip-okolje, genomski pristopi. Podani bodo selekcijski programi za izboljšanje proizvodnih in predvsem novih lastnosti (robustnost, preživitvena sposobnost, dolgoživost, življenjska prireja, proizvodne funkcije).</p>	<p>Relationship between individuals will be used to explain additive and non-additive genetic effects. Methods which modify relationship between individuals will be presented together with molecular genetic methods for verification of relationship. The concept and methods of genetic evaluation will be presented like selection index, mixed model methodology, genomic procedures, and maximum likelihood methods. Novelty in performance testing as well as data recording systems (sources, methods, impact). Importance of the data structure for accuracy of genetic values will be stressed. Both phenotypic and genetic information on metric traits will be dealt with, and their use in selection. Attention will be devoted to random drifts of genes in small populations, maintenance of genetic diversity and reconstruction of endangered populations. Actual topics will also be discussed, such as random regression, genotype-environment interaction, genomic principles. Selection programmes for production traits and especially novel traits will be discussed (robustness, survival analyses, longevity, lifetime production, production functions).</p>
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Temeljna literatura in viri/Readings:

<ul style="list-style-type: none"> • Študijsko gradivo, aktualni znanstveni članki v povezavi s projektno nalogo. / Study material, topical scientific articles in connection with the project task. • Oldenbroek K., and van der Waaij K. 2015. Textbook Animal Breeding and Genetics for BSc students. Centre for Genetic Resources The Netherlands and Animal Breeding and Genomics Centre, 2015. Groen Kennisnet: https://wiki-groenkennisnet.atlassian.net/wiki/spaces/TAB/overview • Gianola, D., Hammond K. 1990. Statistical Methods for Genetic Improvements of Livestock. Springer-Verlag, 534 str.

Cilji in kompetence:

<p>Študent bo poglobil teoretična izhodišča genetskega vrednotenja živali, napovedovanja in spremljanja učinkov selekcije in drugih metod izboljšanja populacij. Spoznal se bo z metodami za proučevanje genetske strukture populacij. Pri tem bomo izpostavili genetske in statistične vidike.</p>	<p>Objectives and competences: The student will deepen theoretical starting points of genetic evaluation of animals, forecasting and monitoring the effects of selection and other methods of improving populations. He or she will be familiarised with methods for studying the genetic structure of populations. Genetic and statistical aspects will be highlighted.</p>
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Predvideni študijski rezultati:

<p>Predvidevamo, da bo študent poglobil znanja iz kvantitativne in statistične genetike in bo usposobljen za načrtovanje raziskave in analiziranje podatkov predvsem za potrebe selekcije in uravnavanje rejce.</p>	<p>Intended learning outcomes: We envisage that a student will deepen knowledge of quantitative and statistical genetics and will be trained for planning research and analysing data mainly for the needs of selection and balanced breeding.</p>
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Metode poučevanja in učenja:

<ul style="list-style-type: none"> • Predavanja, • računalniške vaje, • projektna naloga, • seminarske vaje. 	<p>Learning and teaching methods:</p> <ul style="list-style-type: none"> • lectures, • computer exercises, • project task, • seminar exercises.
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Načini ocenjevanja:	Delež/Weight	Assessment:
- ustni izpit	60,00 %	- oral examination
- projektna naloga	40,00 %	- project task

Ocenjevalna lestvica:	Grading system:
5 - 10, pri čemer velja, da je pozitivna ocena od 6 - 10	5 - 10, a student passes the exam if he is graded from 6 to 10

Reference nosilca/Lecturer's references:

Kovač Milena

FLISAR, Tina, MALOVRH, Špela, TERČIČ, Dušan, HOLCMAN, Antonija, KOVAČ, Milena. Thirty-four generations of divergent selection for 8-week body weight in chickens. *Poultry science*, ISSN 0032-5791, 2014, vol. 93, no. 1, str. 16-23, doi: [10.3382/ps.2013-03464](https://doi.org/10.3382/ps.2013-03464). [COBISS.SI-ID [3333256](#)], [JCR, SNIP]

kategorija: 1A1 (Z1, A', A1/2); uvrstitev: SCI, Scopus, MBP; tipologija ni verificirana
točke: 20.94, št. avtorjev: 5

JENKO, Janez, DUCROCQ, Vincent, KOVAČ, Milena. Comparison of piecewise Weibull baseline survival models for estimation of true and functional longevity in Brown cattle raised in small herds. *Animal*, ISSN 1751-7311, 2013, vol. 7, iss. 10, str. 1583-1591, doi: [10.1017/S1751731113001055](https://doi.org/10.1017/S1751731113001055). [COBISS.SI-ID [4220520](#)], [JCR, SNIP, WoS do 30. 9. 2013: št. citatov (TC): 0, čistih citatov (CI): 0, čistih citatov na avtorja (CIAu): 0, normirano št. čistih citatov (NC): 0, Scopus do 16. 9. 2013: št. citatov (TC): 0, čistih citatov (CI): 0, čistih citatov na avtorja (CIAu): 0, normirano št. čistih citatov (NC): 0]

kategorija: 1A1 (Z1, A', A1/2); uvrstitev: SCI, Scopus, MBP; tipologijo je verificiral OSICB
točke: 36.36, št. avtorjev: 3

JEVŠINEK SKOK, Daša, GODNIČ, Irena, ZORC, Minja, HORVAT, Simon, DOVČ, Peter, KOVAČ, Milena, KUNEJ, Tanja. Genome-wide in silico screening for microRNA genetic variability in livestock species. *Animal genetics*, ISSN 0268-9146, 2013, vol. 44, no. 6, str. 669-677.

<http://onlinelibrary.wiley.com/doi/10.1111/age.12072/pdf>, doi: [10.1111/age.12072](https://doi.org/10.1111/age.12072). [COBISS.SI-ID [3249544](#)], [JCR, SNIP, WoS do 18. 11. 2013: št. citatov (TC): 0, čistih citatov (CI): 0, čistih citatov na avtorja (CIAu): 0, normirano št. čistih citatov (NC): 0, Scopus do 16. 11. 2013: št. citatov (TC): 1, čistih citatov (CI): 1, čistih citatov na avtorja (CIAu): 0.14, normirano št. čistih citatov (NC): 1]

kategorija: 1A1 (Z1, A", A', A1/2); uvrstitev: SCI, Scopus, MBP; tipologijo je verificiral OSICB
točke: 20, št. avtorjev: 7

KOMPREJ, Andreja, MALOVRH, Špela, GORJANC, Gregor, KOMPAN, Drago, KOVAČ, Milena. Genetic and environmental parameters estimation for milk traits in Slovenian dairy sheep using random regression model. *Czech Journal of Animal Science*, ISSN 1212-1819, 2013, vol. 58, no. 3, str. 125-135. [COBISS.SI-ID [3211656](#)], [JCR, SNIP, Scopus do 9. 7. 2013: št. citatov (TC): 0, čistih citatov (CI): 0, čistih citatov na avtorja (CIAu): 0, normirano št. čistih citatov (NC): 0]

kategorija: 1A2 (Z1, A1/2); uvrstitev: SCI, Scopus, MBP; tipologijo je verificiral OSICB
točke: 17.14, št. avtorjev: 5

JENKO, Janez, GORJANC, Gregor, KOVAČ, Milena, DUCROCQ, Vincent. Comparison between sire-maternal grandsire and animal models for genetic evaluation of longevity in a dairy cattle population with small herds. *Journal of dairy science*, ISSN 0022-0302, 2013, vol. 96, str. 8002-8013, doi: [10.3168/jds.2013-6830](https://doi.org/10.3168/jds.2013-6830). [COBISS.SI-ID [4337000](#)], [JCR, SNIP, WoS do 16. 12. 2013: št. citatov (TC): 0, čistih citatov (CI): 0, čistih citatov na avtorja (CIAu): 0, normirano št. čistih citatov (NC): 0, Scopus do 28. 10. 2013: št. citatov (TC): 0, čistih citatov (CI): 0, čistih citatov na avtorja (CIAu): 0, normirano št. čistih citatov (NC): 0]

kategorija: 1A1 (Z1, A', A1/2); uvrstitev: SCI, Scopus, MBP; tipologijo je verificiral OSICB
točke: 34.84, št. avtorjev: 4

GODNIČ, Irena, ZORC, Minja, JEVŠINEK SKOK, Daša, CALIN, George Adrian, HORVAT, Simon, DOVČ, Peter, KOVAČ, Milena, KUNEJ, Tanja. Genome-wide and species-wide in silico screening for intragenic microRNAs in human, mouse and chicken. *PloS one*, ISSN 1932-6203, 2013, vol. 8, no. 6, str. 1-14, e-65165. <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0065165>, doi: [10.1371/journal.pone.0065165](https://doi.org/10.1371/journal.pone.0065165). [COBISS.SI-ID [3234696](#)], [JCR, SNIP, WoS do 16. 9. 2013: št. citatov (TC): 0, čistih citatov (CI): 0, čistih citatov na avtorja (CIAu): 0, normirano št. čistih citatov (NC): 0, Scopus do 20. 11. 2013: št. citatov (TC): 3, čistih citatov (CI): 2, čistih citatov na avtorja (CIAu): 0.25, normirano št. čistih citatov (NC): 1]

kategorija: 1A1 (Z1, A', A1/2); uvrstitev: SCI, Scopus, MBP; tipologijo je verificiral OSICB
točke: 21.2, št. avtorjev: 8

KOMPREJ, Andreja, GORJANC, Gregor, KOMPAN, Drago, KOVAČ, Milena. Lactation curves for milk yield, fat, and protein content in Slovenian dairy sheep. *Czech Journal of Animal Science*, ISSN 1212-1819, 2012, vol. 57, no. 5, str. 231-239. [COBISS.SI-ID [3053448](#)], [[JCR](#), [SNIP](#), [WoS](#) do 7. 8. 2013: št. citatov (TC): 2, čistih citatov (CI): 2, čistih citatov na avtorja (CIAu): 0.50, normirano št. čistih citatov (NC): 2, [Scopus](#) do 3. 7. 2013: št. citatov (TC): 2, čistih citatov (CI): 2, čistih citatov na avtorja (CIAu): 0.50, normirano št. čistih citatov (NC): 2]

kategorija: 1A2 (Z1, A1/2); uvrstitev: SCI, Scopus, MBP; tipologijo je verificiral OSICB

točke: 21.43, št. avtorjev: 4

ŽEMVA, Marjeta, MALOVRH, Špela, LEVART, Alenka, KOVAČ, Milena. Fatty acid composition of meat and adipose tissue from Krškopolje pigs and commercial fatteners in Slovenia. *Archiv für Tierzucht*, ISSN 0003-9438, 2010, vol. 53, št. 1, str. 73-84. [COBISS.SI-ID [2577544](#)], [[JCR](#), [SNIP](#), [WoS](#) do 11. 2. 2014: št. citatov (TC): 2, čistih citatov (CI): 2, čistih citatov na avtorja (CIAu): 0.50, normirano št. čistih citatov (NC): 2, [Scopus](#) do 21. 1. 2014: št. citatov (TC): 3, čistih citatov (CI): 2, čistih citatov na avtorja (CIAu): 0.50, normirano št. čistih citatov (NC): 2]

kategorija: 1A3 (Z1); uvrstitev: SCI, Scopus, MBP; tipologijo je verificiral OSICB

točke: 18.14, št. avtorjev: 4

GORJANC, Gregor, KOVAČ, Milena, KOMPAN, Drago. Inference of genotype probabilities and derived statistics for PrP locus in the Jezersko-Solcava sheep. *Livestock science*, ISSN 1871-1413. [Print ed.], 2010, vol. 129, no. 2/3, str. 232-236. <http://dx.doi.org/10.1016/j.livsci.2010.01.002>, doi: [10.1016/j.livsci.2010.01.002](https://doi.org/10.1016/j.livsci.2010.01.002). [COBISS.SI-ID [2571400](#)], [[JCR](#), [SNIP](#), [WoS](#) do 5. 5. 2010: št. citatov (TC): 0, čistih citatov (CI): 0, čistih citatov na avtorja (CIAu): 0, normirano št. čistih citatov (NC): 0, [Scopus](#) do 16. 5. 2012: št. citatov (TC): 1, čistih citatov (CI): 1, čistih citatov na avtorja (CIAu): 0.33, normirano št. čistih citatov (NC): 1]

kategorija: 1A2 (Z1, A1/2); uvrstitev: SCI, Scopus; tipologijo je verificiral OSICB

točke: 31.85, št. avtorjev: 3

KOMPREJ, Andreja, GORJANC, Gregor, KOMPAN, Drago, KOVAČ, Milena. Covariance components by a repeatability model in Slovenian dairy sheep using test-day records. *Czech Journal of Animal Science*, ISSN 1212-1819, 2009, vol. 54, no. 9, str. 426-434. [COBISS.SI-ID [2496904](#)], [[JCR](#), [SNIP](#), [WoS](#) do 2. 7. 2013: št. citatov (TC): 5, čistih citatov (CI): 4, čistih citatov na avtorja (CIAu): 1.00, normirano št. čistih citatov (NC): 4, [Scopus](#) do 10. 7. 2013: št. citatov (TC): 6, čistih citatov (CI): 3, čistih citatov na avtorja (CIAu): 0.75, normirano št. čistih citatov (NC): 3]

kategorija: 1A2 (Z1, A1/2); uvrstitev: SCI, Scopus, MBP; tipologijo je verificiral OSICB

točke: 22.27, št. avtorjev: 4

LES IN LIGNOCELULOZNI MATERIALI ZA UPORABO V GRADBENIŠTVU

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Les in lignocelulozni materiali za uporabo v gradbeništvu
Course title:	Wood and lignocellulosic materials for building applications
Članica nosilka/UL Member:	UL BF

Študijski programi in stopnja	Študijska smer	Letnik	Semestri	Izbirnost
Bioznanosti, tretja stopnja, doktorski	Ni členitve (študijski program)		Celoletni	izbirni

Univerzitetna koda predmeta/University course code:	0037313
Koda učne enote na članici/UL Member course code:	3815

Predavanja /Lectures	Seminar /Seminar	Vaje /Tutorials	Klinične vaje /Clinical tutorials	Druge oblike študija /Other forms of study	Samostojno delo /Individual student work	ECTS
20	15	40	0	15	160	10

Nosilec predmeta/Lecturer: Miha Humar

Izvajalci predavanj:	Miha Humar, Sergej Medved, Marko Petrič
Izvajalci seminarjev:	
Izvajalci vaj:	
Izvajalci kliničnih vaj:	
Izvajalci drugih oblik:	
Izvajalci praktičnega usposabljanja:	

Vrsta predmeta/Course type: teoretični/theoretical

Jeziki/Languages:	Predavanja/Lectures:	Angleščina, Slovenščina
	Vaje/Tutorial:	Angleščina, Slovenščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisites:
Splošni pogoji za vpis na doktorski študij	General conditions for enrollment in doctoral study

Vsebina:	Content (Syllabus outline):
Les in ostali lignocelulozni materiali so vsakodnevno izpostavljeni biotskim in abiotskim dejavnikom razkroja. Orisani bodo biotski dejavniki razkroja, v prvi vrsti lesne glive. V nadaljevanju bodo predstavljene novejšje biocidne in nebiocidne tehnike zaščite lesa. Velik poudarek bo na modifikaciji lesa (fizikalno kemijskimi, pasivnimi kemijskimi, aktivnimi kemijskimi in površinskimi modifikacijami), zaščiti	Wood and other lignocellulosic materials are daily exposed to biotic and abiotic factors of degradation. Biotic degradation, primarily wood decay fungi will be elucidated. In the next step biocidal and non-biocidal techniques for wood protection will be outlined. Great emphasis will be on the modification of wood (physico-chemical, chemical passive and active and chemical surface modifications), the protection of

<p>lesa s hidrofobnimi sistemi (voski, emulzijami voskov, olji, silani, siloksani...) in konstrukcijski zaščiti, ustrezni izbiri in uporabi lesnih vrst ter različnih lignoceluloznih kompozitov. Študentom predstavimo pomen vode in sorpcijskih lastnosti lesa za delovanje gliv in metodami za določanje vodoodbojnih lastnosti lesa, kakor tudi vplivu na nosilnost različnih lesnih vrst in lignoceluloznih kompozitov. Slušatelje bomo seznanili z metodami za vrednotenje življenjske dobe lesa in lignoceluloznih kompozitov, vplivom klime na življenjsko dobo in metodami za njeno vrednotenje. Opisali bomo model odmerek-odziv, in ga uporabili na praktičnem primeru.</p> <p>Študent se seznanja s pomenom in vlogo različnih lesnih kompozitov v konstrukcijah, pri čemer bo vloga kompozitov razdeljena v pet sklopov in sicer sorpcijski, mehanski, izolativni (toplotnim in akustičnim), ognjeodpornost in fasadni sistemi. Pri vseh sklopih se bodo študenti seznanili z zakonitostmi obnašanja materiala, še posebej pri vzajemnem delovanju več mehanizmov v daljšem časovnem obdobju, pri čemer bomo z različnimi matematičnimi modeli predvideli obnašanje lesnih kompozitov in ohranjanje njihove osnovne funkcije v konstrukciji. Poudarjeni bodo tudi kritični pogoji za porušitev, spremembo lastnosti zaradi spremembe vlažnosti, razvoj mikroorganizmov, plesni, itd.</p> <p>Študenti se podrobno seznanijo z možnostjo uporabe različnih nano biomaterialov kot sistemov izboljšanja lastnosti lesnih ploščnih kompozitov. Seznanijo se z vlogo kompozitov pri zagotavljanju zdravega bivalnega okolja. Predstavili bomo tudi možnost recikliranja lesa in lesnih kompozitov iz starih (porušenih) objektov. Študenti spoznajo tudi spreminjanje lastnosti lesnih kompozitov v daljšem časovnem obdobju, možnosti napovedovanja obnašanja kompozitov in sodobne nedestruktivne postopke ugotavljanja spreminjanja lastnosti kompozitov.</p> <p>Staranje lignoceluloznih materialov, lesnih kompozitov in lesa zaradi izpostavitve vremenskim vplivom (ponovitev osnov). Podrobnejši prikaz fotodegradacijskih procesov v lignoceluloznih materialih ter kratek pregled najprimernejših tehnik za raziskave fotodegradacijskih procesov (SEM, FT-IR in EPR). Sodobni zaščitni premazi. Novosti pri razvoju UV absorberjev, lovilcev prostih radikalov in nanodelcev za zaščito podlage in premaza. Superhidrofobne površine. Samočistilne površine. Nanodelci TiO₂ za zaščito pred UV svetlobo (rutil); fotokatalitsko delovanje TiO₂ v samočistilnih površinah (anataz).</p>	<p>wood with hydrophobic systems (waxes, wax emulsions, oils, silanes, siloxanes...) protection by construction and the appropriate selection and use of wood species and of different lignocellulosic based composites. Students learn the importance of water and sorption properties for the fungal growth and development and methods for determination of the water exclusion efficacy, as well as its impact on load bearing capacity of different lignocellulosic based composites. Attendees will learn about methods for evaluating the service life of the wood and wooden materials, the influence of climate on life expectancy and methods for its estimation. We will describe the dose-response model, and apply it on the practical example.</p> <p>Students are going to learn the significance and role of different wood based composites in construction, whereby their role is going to be divided into five segments; sorption, mechanical insulation (thermal and acoustic), fire resistance and façade system. In all cases students are going to learn the behaviour of material due multiple effect of different factors, whereby they are going to get familiar with different predictional models for the behaviour of wood based composites for retaining their basic function in construction. The emphasize is going to be focused on critical conditions for load failure of construction, degradation of properties due change in moisture, development of different microorganisms and mould, etc. They are also going to learn about the possibility for improvement of different properties by use of different nano biomaterials. Students will also learn about the impact of wood based composites on the living environment. Some possibilities of recycling of wood and wood based composites from old (demolished) objects are going to be presented. Students will learn properties development (changes) of wood based composites during their usage (long term behaviour), prediction possibilities and non-destructive test methods for the tracking of composites properties.</p> <p>Weathering of lignocellulosic materials, wood-based composites and of wood (recapitulation of some basic information). Detailed survey of photodegradation processes in lignocellulosic materials and a short overview of the most appropriate experimental techniques to follow these processes (SEM; FT-IR, EPR). Contemporary protective exterior coatings. Novelty in development of UV absorbers, free radical scavengers and nanoparticles for protection of a substrate and of a surface finish. Superhydrophobic surfaces. Self-cleaning surfaces. TiO₂ nanoparticles for protection against UV light (rutile); photocatalytic activity of TiO₂ in self-cleaning surfaces (anatase).</p>
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Temeljna literatura in viri/Readings:

1. NAVODNIK, J. Slovenija je ustvarjena za nanotehnologije: izdelki in tehnologije prihodnosti: strokovna monografija. Celje: Navodnik, 2007. 399 str. ISBN 978-961-92027-0-8. (izbrana poglavja)
 2. BULIAN, F., GRAYSTONE. J. Wood coatings : theory and practice. Amsterdam: Elsevier, 2009. 320 str. ISBN 978-0-444-52840-7. (izbrana poglavja)
 3. Reinprecht, L. (2016). Wood Deterioration, Protection and Maintenance. In Wood Deterioration, Protection and Maintenance. JohnWiley & Sons, Ltd. <https://doi.org/10.1002/9781119106500>
 4. Mizi, F. Et al., 2009: Performance in use and new products of wood based composites. London, Brunel University Press
 5. Thoemen et al., 2010: Wood–Based Panels – An Introduction for Specialist. London, Brunel University Press
- Študentom bo na razpolago tudi gradivo s predavanj in vaj v elektronski obliki. Gradivo bo objavljeno pred začetkom predavanj na spletni strani. Za izdelavo seminarskih nalog in dodatno razumevanje vsebin bodo študentje uporabili tudi svetovni splet (internet).

Cilji in kompetence:

Cilj predmeta:

Spoznati pomen in delovanje biotskih dejavnikov razgradnje. To bo omogočilo razumevanje delovanje biocidnih in nebiocidnih oblik zaščite lesa in podobnih materialov. Slušatelj razumejo in poznajo pomen vode v lesu za delovanje gliv in poznajo tehnične rešitve kako ohraniti les suh. Poznavanje lastnosti materialov in osnov fiziologije gliv omogoča načrtovanje in vrednotenje življenjske dobe lesa. Za posamezno rabo znajo izbrati ustrezen les ali na lesu osnovan material in predvideti življenjsko dobo. Spoznati in razumeti vlogo lesnih kompozitov v konstrukcija. Študent razume procese staranja kompozitov in posledice staranja na lastnosti kompozitov. Študent spozna in razume različne sisteme napovedovanja obnašanja kompozitov v daljšem časovnem obdobju. Spozna možnosti uporabe različnih biomaterialov kot sistemov izboljšanja lastnosti. Seznan se z metodami spremljanja lastnosti že vgrajenih kompozitov. Spoznati in razumeti fotodegradacijske procese lignoceluloznih materialov in tehnik za spremljanje le-teh. Študent spozna novosti pri razvoju UV zaščitnih snovi, s poudarkom na uporabi nanodelcev v zaščiti lesa pred abiotskimi dejavniki razkroja. Spozna superhidrofobne in samočistilne površine ter razume, kako je možno doseči efekta superhidrofobnosti in samočistilnosti. Prav tako spozna pomen rutilne oblike nanodelcev TiO₂ za zaščito pred UV svetlobo ter TiO₂ v obliki anataza v samočistilnih površinah.

Kompetence:

Doseženo znanje slušatelju omogoči obvladati najpomembnejše nove materiale oz. jih optimalno izbrati, za zaščito lignoceluloznih materialov, ki so v različnih konstrukcijah ter objektih izpostavljeni biotskim in vremenskim vplivom. Pridobljeno znanje omogoči študenti izbrati ustrezen kompozit glede na obremenitev in namen uporabe z vidika željene trajnosti objekta, ter spremljanja obnašanja materiala v konstrukciji.

Objectives and competences:

Objectives: to recognize the importance and mechanisms of the biotic factors of degradation. This will enable understanding of the mode of action of the biocidal and non-biocidal methods for protection of wood and similar materials. Students understand and recognize the importance of water in the wood for the fungal development and understand technical solutions how to keep the wood dry. Understanding of the materials and basic physiology of fungi enables the design and evaluation of the service life of the wood. They are able to select the appropriate wood or wood-based material for each use and predict its service life.

Students will learn and understand the role of wood based composites in construction. They understand the ageing process on the properties of wood based composites. Students will learn and understand different prediction systems of behaviour of composites in longer time of use. They learn about the possibility of use of different biomaterials as reinforcement for wood based composites. Students will also learn about the different methods for tracking of properties of installed(used) composites. Students learn and understand photodegradation processes of lignocellulosic materials and experimental techniques to follow these processes. A student learns new findings in development of UV protective compounds, with a focus on applications of nanoparticles in protection of wood against weathering. He/she learns superhydrophobic and self-cleaning surfaces and understands how to achieve superhydrophobic and self-cleaning effects. In addition, he/she gets known with rutile TiO₂ nanoparticles for UV protection and in TiO₂ the form of anatase for self-cleaning surfaces.

Competences:

The acquired knowledge allows a participant to understand the most important novel weathering-protective materials and to be capable to make the most optimal selection of contemporary protective means for lignocellulosic materials in various constructions and objects that are exposed to weathering and biotic factors of the decay.

	Gain knowledge will enable the student to select appropriate composite with regard to the load/exposure from the aspect of wished service lifetime and to track the behaviour of material in construction.
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<p>Predvideni študijski rezultati:</p> <p>Znanje in razumevanje: <i>Znanje in razumevanje:</i> Študent pozna mehanizme glivne razgradnje lesa, pomen vode v lesu. Seznanjen je z najpomembnejšimi biocidnimi in nebiocidnimi rešitvami za zaščito lesa, njihovimi prednostmi in omejitvami. Za posamezen namen uporabe zna izbrati ustrezno lesno vrsto, postopek zaščite in način uporabe.</p> <p>Spoznati in razumeti vlogo lesnih kompozitov v konstrukcija. Študent razume procese staranja kompozitov in posledice staranja na lastnosti kompozitov. Študent spozna in razume različne sisteme napovedovanja obnašanja kompozitov v daljšem časovnem obdobju. Spozna možnosti uporabe različnih biomaterialov kot sistemov izboljšanja lastnosti. Seznan se z metodami spremljanja lastnosti že vgrajenih kompozitov. Študent pozna in razume procese fotodegradacije lignoceluloznih materialov. Pozna najnovije materiale za zaščito lignoceluloznih materialov in premazov pred vremenskimi vplivi. Pozna in razume pomen superhidrofobnih in samočistilnih površin za zaščito lesenih / lignoceluloznih elementov v različnih konstrukcijah in objektih, ki so izpostavljeni vremenskim vplivom.</p> <p><i>Refleksija:</i> predmet predstavlja strokovni temelj v skladu z naravo študija in je zelo dobra podlaga za nadaljnje proučevanje lastnosti obdelanih materialov in površin ter sodobnih materialov in postopkov površinske obdelave lesa.</p> <p><i>Prenosljive spretnosti:</i> študent pridobljeno znanje uporablja pri drugih tehnoloških predmetih. Zna uporabiti domačo in tujo literaturo ter računalniške baze podatkov. Poleg tega obvlada osnove znanstveno raziskovalnega dela (postavitev hipoteze na osnovi svojega znanja in literaturnih podatkov, načrt eksperimenta, razprava in ovrednotenje rezultatov).</p>	<p>Intended learning outcomes:</p> <p>Knowledge and understanding: <i>Knowledge and understanding:</i> Students understands the mode of fungal degradation and the importance of water in wood. They are familiar with different techniques for wood protection, their advantages in disadvantages. They understand how to select proper wood species, proper treatment and design its use for various building applications.</p> <p>Students will learn and understand the role of wood based composites in construction. They understand the ageing process on the properties of wood based composites. Students will learn and understand different prediction systems of behaviour of composites in longer time of use. They learn about the possibility of use of different biomaterials as reinforcement for wood based composites. Students will also learn about the different methods for tracking of properties of installed (used) composites. A student knows and understands photodegradation processes of lignocellulosic materials. He/she knows contemporary materials for protection of lignocellulosic materials and surface coatings for their protection against weathering. He/she is acquainted with and understands the meaning of superhydrophobic and self-cleaning surfaces for protection of lignocellulosic elements in various constructions and objects that are exposed to weathering.</p> <p><i>Reflections:</i> the course is the professional fundament in accordance with the nature of the study. It represents a firm basis for further studies of properties of treated materials and surfaces and of contemporary materials and surface treatment processes.</p> <p><i>Transferable skills:</i> a student can use the knowledge at other technological courses. He/she knows to use scientific literature and computer data bases. Besides, he/she is acquainted with methods of scientific research work (can make a hypothesis, experimental plan, discussion, critical evaluation of the results).</p>
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<p>Metode poučevanja in učenja:</p> <p>Predavanja (20 ur), Seminarji (15 ur), Laboratorijske vaje (40 ur), Ostalo (15 ur)</p>	<p>Learning and teaching methods:</p> <p>Lectures (20 h) Seminar (15 h) Laboratory work (40 h) Other (15 h)</p>
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<p>Načini ocenjevanja:</p> <p>Pisni in ustni izpit</p>	<p>Delež/Weight</p> <p>60,00 %</p>	<p>Assessment:</p> <p>Oral and written exam</p>
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Seminar	40,00 %	Seminar
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Ocenjevalna lestvica:

5 - 10, pri čemer velja, da je pozitivna ocena od 6 - 10

Grading system:

5 - 10, a student passes the exam if he is graded from 6 to 10

Reference nosilca/Lecturer's references:
Miha Humar

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- KERŽIČ, Eli, HUMAR, Miha. Studies on the material resistance and moisture dynamics of wood after artificial and natural weathering. *Wood material science & engineering*. 2022, vol. 17, no. 6, str. 551-557, ilustr. ISSN 1748-0280. <https://www.tandfonline.com/doi/full/10.1080/17480272.2021.1902388>, DOI: 10.1080/17480272.2021.1902388.
- KERŽIČ, Eli, LESAR, Boštjan, HUMAR, Miha. Influence of weathering on surface roughness of thermally modified wood. *Bioresources*. 2021, vol. 16, iss. 3, str. 4575-4692. ISSN 1930-2126. https://bioresources.cnr.ncsu.edu/wp-content/uploads/2021/05/BioRes_16_3_4675_Kerzic_LH_Infl_Waathering_Surface_Roughness_T herm_Wood_18382.pdf.
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Marko Petrič

1. ŽIGON, Jure, KOVAČ, Janez, PETRIČ, Marko. The influence of mechanical, physical and chemical pre-treatment processes of wood surface on the relationships of wood with a waterborne opaque coating. *Progress in organic coatings*. [Online ed.]. ISSN 1873-331X, 2022, vol. 162, str. 1-14.
2. DAHLE, Sebastian, PIKALO, Megi, ŽIGON, Jure, ZAPLOTNIK, Rok, PETRIČ, Marko, PAVLIČ, Matjaž. An open-source surface barrier discharge plasma pretreatment for reduced cracking of outdoor wood coatings. *Cellulose*. ISSN 1572-882X, 2021, vol. 28, iss. 12, str. 8055-8076.
3. NOWROUZI, Zahra, MOHEBBY, Behbood, EBRAHIMI, Morteza, PETRIČ, Marko. Weathering performance of thermally modified wood coated with polyacrylate containing olive leaf extract as a bio-based additive. *European journal of wood and wood products*. [Print ed.]. ISSN 0018-3768, 2021, vol. 79, no. 6, str. 1551-1562.
4. ŽIGON, Jure, PAVLIČ, Matjaž, PETRIČ, Marko, DAHLE, Sebastian. Surface properties of coated MDF pre-treated with atmospheric plasma and the influence of artificial weathering. *Materials chemistry and physics*. [Print ed.]. ISSN 0254-0584, 2021, vol. 263, str. 1-12 (124358).
5. CHEUMANI-YONA, Arnaud Maxime, ŽIGON, Jure, NGUETEU KAMLO, Alexis, PAVLIČ, Matjaž, DAHLE, Sebastian, PETRIČ, Marko. Preparation, surface characterization, and water resistance of silicate and sol-silicate inorganic-organic hybrid dispersion Coatings for Wood. *Materials*. ISSN 1996-1944, 2021, vol. 14, iss. 13, str. 1-23
6. ŽIGON, Jure, PETRIČ, Marko, DAHLE, Sebastian. Artificially aged spruce and beech wood surfaces reactivated using FE-DBD atmospheric plasma. *Holzforschung*. ISSN 0018-3830, 2019, vol. 73, iss. 12, str. 1069-1081.

Sergej Medved

1. JIANG, Wen, ADAMOPOULOS, Stergios, PETRIČ, Marko, ŠERNEK, Milan, MEDVED, Sergej. Particleboards with partially liquefied bark of different particle sizes. *Drewno*. 2021, vol. 64, no. 207, str. 43-57. ISSN 1644-3985. <http://drewno-wood.pl/pobierz-394>, DOI: 10.12841/wood.1644-3985.363.10. [COBISS.SI-ID 70741507]
2. MEDVED, Sergej, TUDOR, Eugenia Mariana, BARBU, Marius-Catalin, YOUNG, Timothy M. Thermal conductivity of different bio-based insulation materials = Toplotna prevodnost različnih bio-izolacijskih materialov. *Les*. [Tiskana izd.]. 2021, letn. 70, št. 1, str. 73-82, ilustr. ISSN 0024-1067. <http://www.les-wood.si/index.php/leswood/article/view/123/84>
3. GORGIEVA, Selestina, JANČIČ, Urška, HRIBERNIK, Silvo, FAKIN, Darinka, STANA-KLEINSHEK, Karin, MEDVED, Sergej, FAKIN, Tomaž, BOŽIČ, Mojca. Processing and functional assessment of anisotropic cellulose nanofibril/Alolt/sodium silicate: based aerogels as flame retardant thermal insulators. *Cellulose*. 2020, vol. 27, str. 1661-1683. ISSN 0969-0239. DOI: 10.1007/s10570-019-02901-3. [COBISS.SI-ID 22845462]
4. ŠPANIĆ, Nikola, JAMBREKOVIĆ, Vladimir, ŠERNEK, Milan, MEDVED, Sergej. Influence of natural fillers on thermal and mechanical properties and surface morphology of cellulose acetate-based biocomposites. *International Journal of Polymer Science*. 2019, vol. 2019, article id 1065024, str. 1-17. ISSN 1687-9430. <https://www.hindawi.com/journals/ijps/2019/1065024/>, DOI: 10.1155/2019/1065024. [COBISS.SI-ID 3065225]
5. MEDVED, Sergej, ŽGAJNER, Damjan, ANTONOVIĆ, Alan. The dynamics of thickness swelling and bond strength loss of different wood-based panels at exposure to humid climate and immersion into water = Dinamika spreminjanja debelinskega nabreka in kakovosti zlepljenosti različnih lesnih ploščnih kompozitov pri vlažni klimi in potopitvi v vodo. *Les*. [Tiskana izd.]. jun. 2019, letn. 68, št. 1, str. 25-35, ilustr. ISSN 0024-1067. <http://www.les-wood.si/index.php/leswood/article/view/64/41>

6. TONDI, Giancarlo, HU, Jinbo, RIZZO, Filippo, BUH, Janez, MEDVED, Sergej, PETUTSCHNIGG, Alexander, THEVENON, Marie-France. Tannin-caprolactam and tannin-PEG formulations as outdoor wood preservatives : weathering properties. *Annals of forest science*. 2017, vol. 74, iss. 19, str. 1-12. ISSN 1286-4560. <https://link.springer.com/article/10.1007/s13595-016-0605-y>, DOI: 10.1007/s13595-016-0605-y. [COBISS.SI-ID 2783369]

LES, SKORJA IN OKOLJE

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Les, skorja in okolje
Course title:	Wood, bark and environment
Članica nosilka/UL Member:	UL BF

Študijski programi in stopnja	Študijska smer	Letnik	Semestri	Izbirnost
Bioznanosti, tretja stopnja, doktorski	Ni členitve (študijski program)		Celoletni	izbirni

Univerzitetna koda predmeta/University course code:	0037314
Koda učne enote na članici/UL Member course code:	3816

Predavanja /Lectures	Seminar /Seminar	Vaje /Tutorials	Klinične vaje /Clinical tutorials	Druge oblike študija /Other forms of study	Samostojno delo /Individual student work	ECTS
10	15	15	0	5	80	5

Nosilec predmeta/Lecturer: Maks Merela

Izvajalci predavanj:	Angela Balzano, Katarina Čufar, Maks Merela
Izvajalci seminarjev:	
Izvajalci vaj:	Angela Balzano
Izvajalci kliničnih vaj:	
Izvajalci drugih oblik:	
Izvajalci praktičnega usposabljanja:	

Vrsta predmeta/Course type: teoretični/theoretical

Jeziki/Languages:	Predavanja/Lectures:	Angleščina, Slovenščina
	Vaje/Tutorial:	Angleščina, Slovenščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisites:
Splošni pogoji za vpis na doktorski študij.	General requirements for enrolment in doctoral study.

Vsebina:	Content (Syllabus outline):
Predmet obravnava les in skorjo dreves z vidika tkiv, ki nastanejo z delovanjem kambija pod vplivom notranjih in zunanjih okoljskih dejavnikov. Naštevamo tematike. Kambij kot meristemsko tkivo dreves, delovanje kambija, delitve celic, nastanek sekundarnega ksilema in floema. Sezonska dinamika nastajanja tkiv pri iglavcih in listavcih v zmerni, hladni (borealni) in sredozemski klimi. Modeli dinamike	The course deals with wood and bark as tissues formed by the cambium under the influence of internal and external (environmental) factors. The topics: cambium as a meristem, its function, cell division, formation of secondary xylem and phloem. Seasonal dynamics of wood and phloem formation in conifers and dycotiledon trees in temperate, cold (boreal) and Mediterranean climate. Models of

<p>nastajanja lesa. Vpliv zunanjih dejavnikov na dinamiko nastajanja lesa in floema in preživetvene strategije dreves tudi z vidika klimatskih sprememb. Metode za spremljanje delovanja kambija v odraslih drevesih in tehnike priprave mikroskopskih preparatov. Specifična uporaba mikroskopskih tehnik: svetlobna mikroskopija, elektronske mikroskopija, UV-mikrospektrofotometrija. Dendrokronologija - branike v lesu kot arhiv, analiza branik in rekonstrukcija preteklih dejavnikov. Les kot tkivo v drevesu, kot material za predelavo in obdelavo ter v kulturni dediščini z vidika zgradbe in dendrokronologije.</p> <p>Baze dendrokronoloških, lesno-anatomskih, klimatskih in fenoloških podatkov in njihova uporaba za proučevanje vpliva klime in okolja na nastajanje lesa in tkiv skorje. Les, rekonstrukcija klime, dendroekologija. Paleoklimatski viri podatkov . Okoljski vzroki za variabilnost fenologije v različnih časovnih (desetletje, stoletja, tisočletje) in prostorskih (lokalna, regionalna, globalna) skalah.</p>	<p>dynamics of wood formation. Influence of external factors on dynamics of wood and phloem formation and survival strategies of trees in terms of climate change. Methods for monitoring of process in the cambium in adult trees and techniques of tissue preparation. Specific use of microscopic techniques: light microscopy, transmission electron microscopy, UV-microspectrophotometry. Dendrochronology, tree-rings as an archive, tree-ring analysis and reconstruction of historical events. Wood as a tree tissue, raw material and wood in cultural heritage – from the perspective of wood structure and dendrochronology.</p> <p>Dendrochronological, wood anatomical climatic and phenological data bases and their use for studying the impact of climate and environment on wood and phloem tissue production. Wood, reconstruction of climate, dendroecology. Paleoclimatic data sources. Environmental sources of variability of phenological development on different time (decade, century and millennium) and spatial (local, regional, global) scales.</p>
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Temeljna literatura in viri/Readings:

<p>Schweingruber, F. H. 2007. Wood Structure and environment. Springer Series in Wood Science, Springer, Berlin-Heidelberg, 279 str., https://plus.cobiss.net/cobiss/si/sl/bib/bfles/28626437 COBISS.SI-ID - 28626437</p> <p>Vaganov, E.A., Hugens, M.K., Shaskin A.V. 2006. Growth dynamics of conifer tree rings. Images of past and future environments. Springer, 354 str., https://plus.cobiss.net/cobiss/si/sl/bib/bfles/1431177 COBISS.SI-ID - 1431177</p> <p>revijalni članki s področja, tekoča periodika, druga učna gradiva</p>

Cilji in kompetence:

<p>Poznavanje lesa in skorje, z vidika notranjih in okoljskih dejavnikov med procesom nastajanja.</p>	<p>Objectives and competences:</p>
	<p>Knowledge on wood and bark, in terms of internal and environmental factors during the process of their formation.</p>

Predvideni študijski rezultati:

<p>Znanje in razumevanje: Poznavanje zgradbe lesa in skorje, z vidika procesov med nastajanjem in vpliva okoljskih dejavnikov na procese. Razumevanje, kako obravnavani dejavniki vplivajo na zgradbo, ter možnost uporabe lesa in skorje z ekološkega, tehnološkega in družbeno-ekonomskega vidika.</p>	<p>Intended learning outcomes:</p>
	<p>Knowledge and understanding: Knowledge of the wood and bark structure, in terms of processes during their formation and impact of environmental factors. Understanding how these factors influence the structure and affect wood and bark use from an ecological, technological and socio-economic point of view.</p>

Metode poučevanja in učenja:

<p>Interaktivna predavanja in razlage, konzultacije, vaje, seminar.</p>	<p>Learning and teaching methods:</p>
	<p>Interactive lectures and explanations, tutorials, seminars.</p>

Načini ocenjevanja:

<p>Izdelava in zagovor seminarja.</p>	<p>Delež/Weight</p>	<p>Assessment:</p>
	<p>100,00 %</p>	<p>Seminar work and its presentation.</p>

Ocenjevalna lestvica:

5 - 10, pri čemer velja, da je pozitivna ocena od 6 - 10

Grading system:

5 - 10, a student passes the exam if he is graded from 6 to 10

Reference nosilca/Lecturer's references:**Maks Merela**

- MARTINEZ DEL CASTILLO, Edurne, ZANG, Christian, BURAS, Allan, HACKET-PAIN, Andrew, ESPER, Jan, SERRANO-NOTIVOLI, Roberto, ČUFAR, Katarina, MERELA, Maks, GRIČAR, Jožica, PRISLAN, Peter, et al. Climate-change-driven growth decline of European beech forests. *Communications biology*. 2022, vol. 5, article no. 163, str. 1-9. ISSN 2399-3642. <https://www.nature.com/articles/s42003-022-03107-3>, DOI: 10.1038/s42003-022-03107-3. [COBISS.SI-ID 101080067], [JCR, SNIP, WoS do 6. 12. 2022: št. citatov (TC): 13, čistih citatov (CI): 12, čistih citatov na avtorja (CIAu): 0,72, Scopus do 25. 12. 2022: št. citatov (TC): 17, čistih citatov (CI): 16, čistih citatov na avtorja (CIAu): 0,96]
- MEDVED, Sergej, KRAPEŽ TOMEČ, Daša, BALZANO, Angela, MERELA, Maks. Alien wood species as a resource for wood-plastic composites. *Applied sciences*. 2021, vol. 11, iss. 1, str. 1-16, ilustr. ISSN 2076-3417. <https://www.mdpi.com/2076-3417/11/1/44>, DOI: 10.3390/app11010044. [COBISS.SI-ID 44178179], [JCR, SNIP, WoS do 26. 10. 2022: št. citatov (TC): 4, čistih citatov (CI): 3, čistih citatov na avtorja (CIAu): 0,75, Scopus do 1. 12. 2021: št. citatov (TC): 4, čistih citatov (CI): 3, čistih citatov na avtorja (CIAu): 0,75]
- ŠKRK, Nina, SERRANO-NOTIVOLI, Roberto, ČUFAR, Katarina, MERELA, Maks, ČREPINŠEK, Zalika, KAJFEŽ-BOGATAJ, Lučka, DE LUIS, Martin. SLOCLIM : a high-resolution daily gridded precipitation and temperature dataset for Slovenia. *Earth system science data*. 2021, vol. 13, iss. 7, str. 3577-3592. ISSN 1866-3516. <https://essd.copernicus.org/articles/13/3577/2021/>, DOI: 10.5194/essd-13-3577-2021. [COBISS.SI-ID 71860739], [JCR, SNIP, WoS do 20. 12. 2022: št. citatov (TC): 3, čistih citatov (CI): 2, čistih citatov na avtorja (CIAu): 0,29, Scopus do 26. 12. 2022: št. citatov (TC): 5, čistih citatov (CI): 4, čistih citatov na avtorja (CIAu): 0,57]
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Katarina Čufar

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Angela Balzano

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LESNA BIOMASA KOT VIR DRAGOCENIH SPOJIN

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Lesna biomasa kot vir dragocenih spojin
Course title:	High value added compounds from woody biomass
Članica nosilka/UL Member:	UL BF

Študijski programi in stopnja	Študijska smer	Letnik	Semestri	Izbirnost
Bioznanosti, tretja stopnja, doktorski	Ni členitve (študijski program)		Celoletni	izbirni

Univerzitetna koda predmeta/University course code:	0037315
Koda učne enote na članici/UL Member course code:	3817

Predavanja /Lectures	Seminar /Seminar	Vaje /Tutorials	Klinične vaje /Clinical tutorials	Druge oblike študija /Other forms of study	Samostojno delo /Individual student work	ECTS
10	20	10	0	5	80	5

Nosilec predmeta/Lecturer: Primož Oven

Izvajalci predavanj: Blaž Likozar, Primož Oven, Ida Poljanšek, Viljem Vek
Izvajalci seminarjev:
Izvajalci vaj:
Izvajalci kliničnih vaj:
Izvajalci drugih oblik:
Izvajalci praktičnega usposabljanja:

Vrsta predmeta/Course type: teoretični/theoretical

Jeziki/Languages:	Predavanja/Lectures:	Angleščina, Slovenščina
	Vaje/Tutorial:	Angleščina, Slovenščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisites:
Splošni pogoji za vpis na doktorski študij	General requirements for enrolment in doctoral study.

Vsebina:	Content (Syllabus outline):
Potencial različnih kategorij lesne biomase za pridobivanje proizvodov z visoko dodano vrednostjo. Globalni trendi na področju predelave ligno-celulozne biomase: pridobivanje gradnikov iz olesenele celične stene in pridobivanje naravnih produktov lesnih rastlin (ekstraktivov). Naravni produkti lesne biomase, sistematika in variabilnost. Posebnosti ekstrakcijskih tehnik za	Potential of different categories of woody biomass for production of high-added value products. Global trends in the field of ligno-cellulosic biomass processing: acquisition of structural components of cell walls and natural products of wood plants (extractives). Natural products of woody biomass, systematics and variability. Features of extraction techniques for the

<p>pridobivanje ekstraktivov iz lesne biomase. Preparativna ločba in izolacija ter kvalitativna in kvantitativna analiza spojin. Uporabni potencial lesnih ekstraktivov.</p> <p>Hierarhične zgradba lesnih vlaken.</p> <p>Priprava mikrofibrilirane (MFC) in nanofibrilirane celuloze (NFC). Priprava celuloznih nanokristalov (CN). Fizikalne in kemijske lastnosti MFC, NFC in CN. Omejitve pri uporabi in modifikacija površine. Uporaba NFC in CN kot ojačitvenega materiala, kot osnove ali dodatka za filme, membrane, premaze, pene, hidrogelne in aerogelne, in kot nosilcev za bioaktivne snovi iz lesne biomase. Pregled inovativne rabe lignina in hemiceluloz.</p>	<p>production of extractive from woody biomass. Preparative separation and isolation, and qualitative and quantitative analysis of compounds. Use of extractive in different fields of applications.</p> <p>Hierarchical structure of woody fibers. Preparation of micro-fibrillated (MFC) and nano-fibrillated cellulose (NFC) cellulose. Preparation of cellulose nanocrystals (CN). Physical and chemical properties of MFC, NFC and CN. Restrictions in use and modification of cellulose surface. Application of NFC and CN as reinforcing material, as basic and additive for films, membranes, coatings, foams, hydrogels and aerogels, as well as carriers for bioactive substances from woody biomass. Overview of innovative use of lignin and hemicelluloses.</p>
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Temeljna literatura in viri/Readings:

Fengel D., Wegener G. 1989. Wood, Chemistry, Ultrastructure, Reactions. Berlin, Walter de Gruyter: 613 str. Izbrani članki v domačih in tujih specializiranih strokovnih in znanstvenih revijah.

Hon, D.N.-S. , Shiraishi, N. 2000. Wood and cellulosic chemistry. Marcell Dekke, New York, Basel. 914. (priporočena literatura)

Rowe, J.W. Natural products of woody plants I and II. Springer Verlag. 1243 str. (priporočena literatura)

Dufresne A (2012) Nanocellulose, From Nature to High Performance Tailored Materials. doi:10.1515/9783110254600 (priporočena literatura)

Wertz J-L, Bédué O (2013) Lignocellulosic biorefineries. CRC Press. Taylor and Francis Group, LLC, 527. (priporočena literatura)

Cilji in kompetence:

Cilji:
 Pridobiti poglobljeno znanje o potencialu lesne biomase in možnostih pridobivanja produktov z visoko dodano vrednostjo. Pridobiti specializirano znanje s področja pridobivanja in uporabe ekstraktivov ter mikro- in nanofibrilirane celuloze iz lesne biomase.

Kompetence:
 Doktorand je kompetenten za presojo primernosti ligno-celulozne biomase za pridobivanje produktov z visoko dodano vrednostjo. Ima ustrezne kompetence za samostojno raziskovalno delo na področju lesnih ekstraktivov in NFC.

Objectives and competences:

Objectives:
 To get knowledge on potential of different categories of woody biomass for production of high-added value products. To gain specialized knowledge in the field of production and use of extractives, and micro- and nano-fibrillated cellulose from woody biomass.

Competences:
 Doctorand is competent for evaluation of suitability of ligno-cellulosic biomass for production of high value added products. He has competences for independent research in the field of extractives and NFC.

Predvideni študijski rezultati:

Znanje in razumevanje:
 Doktorand pozna različne kategorije lesne biomase in razume njihov potencial za pridobivanje proizvodov z visoko dodano vrednostjo. Seznanjen je s sodobnimi trendi na področju biorafinerij, s poudarkom na pridobivanju ekstraktivov in NFC. Razume ekstrakcijske tehnike in načine za izolacijo, vrednotenje in uporabo ekstraktivov.

Razume pripravo MFC, NFC in CN iz lesne biomase. Seznanjen je s fizikalnimi in kemijskimi lastnostmi teh produktov. Pozna metode za modifikacijo NFC, prav tako pa možnosti njene uporabe v različnih sodobnih materialih.

Intended learning outcomes:

Knowledge and understanding:
 Doctorand understands different categories of woody biomass and understands its potential for production of high value added products. He is familiar with contemporary trends in biorefinery processing, with the accent on extractives and NFC. He understands extraction and isolation techniques as well as value and use of extractives. He understands preparation of MFC, NFC and CN from woody biomass. He knows physical and chemical features of these products. He knows methods for NFC modification and possibilities for its use in different materials.

Reflection:

<p>Refleksija: Doktorand je sposoben kritično ovrednotiti potencial različnih tipov lesne biomase za proizvodnjo dveh velikih skupin proizvodov, ekstraktivov in MFC ter NFC. Lahko presoja o izbiri ustreznih postopkov za pridobivanje ekstraktivov za njihovo izolacijo ter njihovo kvalitativno in kvantitativno vrednotenje. Prav tako pridobi poglobljen vpogled v produkcijo celuloznih fragmentov mikro in nanodimenzij, zelo dobro pozna njihove lastnosti ter primernost postopkov za modifikacijo teh lastnosti in možnosti za uporabo NFC in CN.</p> <p>Prenosljive spretnosti: Doktorand pridobljeno znanje uporablja pri drugih predmetih doktorskega študija. Smiselno uporablja strokovno znanstveno literaturo in druge vire v svojem raziskovalnem delu. Pridobljeno znanje dopolnjuje celosten vpogled v problematiko izkoriščanja lesne biomase.</p>	<p>Doctorand is able to critically assess potential of woody biomass for production of two groups of products, extractives and MFC and NFC. He is able to assess the suitability of appropriate procedures for production of extractives, their isolation and qualitative and quantitative evaluation. He gets deeper insight into production cellulose fragments of micro and nano scale dimensions. He is able to reflect properties of NFC and CN and suitability for their use.</p> <p>Transferrable knowledge: Doctorand is able to use the knowledge in other courses of the study. He is able to constructively use the professional and scientific literature in his research work. Acquired knowledge fulfils integral insight into problematic of exploitation of woody biomass.</p>
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Metode poučevanja in učenja:

Predavanja (10 ur),
Seminarji (20 ur),
Laboratorijske vaje (10 ur),
Drugo (5 ur)

Learning and teaching methods:

Lectures (100 h)
Seminar (20 h)
Laboratory work (10 h)
Others (5 h)

Načini ocenjevanja:

Pisni izpit
Seminar

Delež/Weight

70,00 %
30,00 %

Assessment:

Oral and written exam
Seminar

Ocenjevalna lestvica:

5 - 10, pri čemer velja, da je pozitivna ocena od 6 - 10

Grading system:

5 - 10, a student passes the exam if he is graded from 6 to 10

Reference nosilca/Lecturer's references:

Primož Oven

- HUMAR, Miha, VEK, Viljem, OVEN, Primož, LESAR, Boštjan, KERŽIČ, Eli, HOČEVAR, Miha, BRUS, Robert. Durability and moisture dynamics of Douglas-fir wood from Slovenia. *Frontiers in plant science*. 2022, vol. 13, art. no. 860734, 15 str., ilustr. ISSN 1664-462X.
<https://www.frontiersin.org/articles/10.3389/fpls.2022.860734/full>, DOI: 10.3389/fpls.2022.860734.
[COBISS.SI-ID 102652675], [JCR, SNIP, WoS do 28. 11. 2022: št. citatov (TC): 2, čistih citatov (CI): 2, čistih citatov na avtorja (CIAu): 0,29, Scopus do 1. 12. 2022: št. citatov (TC): 2, čistih citatov (CI): 2, čistih citatov na avtorja (CIAu): 0,29] kategorija: 1A1 (Z, A', A1/2); uvrstitev: SCIE, Scopus, MBP (BIOABS, BIOPREW, PUBMED, DOAJ); tip dela je verificiral OSICB točke: 20.52, št. avtorjev: 7
- BARBERO-LÓPEZ, Aitor, VEK, Viljem, POLJANŠEK, Ida, VIRJAMO, Virpi, LÓPEZ-GÓMEZ, Yeray Manuel, SAINIO, Tuomo, HUMAR, Miha, OVEN, Primož, HAAPALA, Antti. Characterisation, recovery and activity of hydrophobic compounds in Norway spruce log soaking pit water : could they be used in wood preservative formulations?. *Waste and biomass valorization*. [Spletna izd.]. 2022, vol. 13, iss. 5, 1 spletni vir (1 datoteka pdf ([12] str.)). ISSN 1877-265X.
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[COBISS.SI-ID 92903683], [JCR, SNIP, WoS do 26. 10. 2022: št. citatov (TC): 1, čistih citatov (CI): 1, čistih citatov na avtorja (CIAu): 0,11, Scopus do 20. 9. 2022: št. citatov (TC): 1, čistih citatov (CI): 1, čistih citatov na avtorja (CIAu): 0,11] kategorija: 1A3 (Z); uvrstitev: SCIE, Scopus, MBP (INSPEC, COMPENDEX, CAB); tip dela je verificiral OSICB točke: 8.49, št. avtorjev: 9
- VEK, Viljem, POLJANŠEK, Ida, HUMAR, Miha, WILLFÖR, Stefan, OVEN, Primož. In vitro inhibition of extractives from knotwood of Scots pine (*Pinus sylvestris*) and black pine (*Pinus nigra*) on

growth of *Schizophyllum commune*, *Trametes versicolor*, *Gloeophyllum trabeum* and *Fibroporia vaillantii*. *Wood Science and Technology*. 2020, vol. 54, iss. 6, str. 1645 - 1662, ilustr. ISSN 0043-7719. <https://link.springer.com/article/10.1007/s00226-020-01229-7>, DOI: 10.1007/s00226-020-01229-7. [COBISS.SI-ID 33132803], [JCR, SNIP, WoS do 11. 1. 2023: št. citatov (TC): 13, čistih citatov (CI): 9, čistih citatov na avtorja (CIAu): 1,80, Scopus do 17. 1. 2023: št. citatov (TC): 14, čistih citatov (CI): 10, čistih citatov na avtorja (CIAu): 2,00] kategorija: 1A1 (Z, A', A1/2); uvrstitev: SCIE, Scopus, MBP (INSPEC, COMPENDEX, METADEX, CAB, PUBMED); tip dela je verificiral OSICN točke: 21.64, št. avtorjev: 5

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Ida Poljanšek

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LOMNA MEHANIKA LESA IN LESNIH KOMPOZITOV

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Lomna mehanika lesa in lesnih kompozitov
Course title:	The fracture mechanics of wood and wood composites
Članica nosilka/UL	UL BF
Member:	

Študijski programi in stopnja	Študijska smer	Letnik	Semestri	Izbirnost
Bioznanosti, tretja stopnja, doktorski	Ni členitve (študijski program)		Celoletni	izbirni

Univerzitetna koda predmeta/University course code: 0643134

Predavanja /Lectures	Seminar /Seminar	Vaje /Tutorials	Klinične vaje /Clinical tutorials	Druge oblike študija /Other forms of study	Samostojno delo /Individual student work	ECTS
10	20	10	0	5	80	5

Nosilec predmeta/Lecturer: Miran Merhar

Izvajalci predavanj:	Miran Merhar
Izvajalci seminarjev:	
Izvajalci vaj:	
Izvajalci kliničnih vaj:	
Izvajalci drugih oblik:	
Izvajalci praktičnega usposabljanja:	

Vrsta predmeta/Course type: teoretični /theoretical

Jeziki/Languages:	Predavanja/Lectures:	Angleščina, Slovenščina
	Vaje/Tutorial:	Angleščina, Slovenščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Prerequisites:

Splošni pogoji za vpis na doktorski študij.	General requirements for enrolment in doctoral study.
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Vsebina:

Content (Syllabus outline):

Osnovne mehanske lastnosti materialov kot so moduli elastičnosti, strižni moduli, Poissonova razmerja, ter normalne in strižne trdnosti v osnovnih smereh danes ne zadostujejo v dovolj veliki meri za ovrednotenje mehanskih lastnosti materialov tako v procesu mehansko obdelovalnih	Basic mechanical properties of materials such as modules of elastic, shear modules, Poisson's relationships, and normal and shear strength in basic directions today are not sufficiently sufficient to evaluate the mechanical properties of materials in the process of mechanical machining technologies as well as in wood construction. One of the modern
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<p>tehnologij kot tudi gradnji z lesom. Ena izmed sodobnih mehanskih lastnosti materialov, ki se vztrajno razvijajo v zadnjih desetletjih je vsekakor lomna mehanika.</p> <p>Brez nje danes ni možno dovolj uspešno analizirati mejnih obremenitev v konstrukcijah kot tudi v procesu odrezovanja različnih materialov. Ravno tako je potrebno v porušitvenih procesih materiala upoštevati kombinacijo vseh omenjenih napetostnih stanj.</p> <p>Vsebina predmeta zajema:</p> <p>Osnove lomne mehanike izotropnih in ortotropnih materialov, kot je les in lesni kompoziti. Osnovni načini lomne mehanike: I,II in III (natezni, strižni). Kombinacija normalnih in strižnih načinov. Porazdelitev napetosti pred konico razpoke. Pomen kritične intenzitete napetosti in frakturne energije v procesu nastanka novih površin. Vpliv kritične intenzitete napetosti na velikost porušnih obremenitev materiala. Vpliv velikosti razpoke na porušne obremenitve materiala. Razlike med krhkimi in duktilnimi materiali. Stabilne in nestabilne napredovanje razpok. Inicijacija razpok. Načini določevanja kritične intenzitete napetosti ter frakturne energije. Vpliv oblike in različnih velikosti vzorcev na določevanje frakturnih lastnosti materiala.</p> <p>Vpliv kombinacije različnih napetostnih stanj na porušitev materiala. Različni porušitveni kriteriji: Tsai-Wu, Puck, Tsai-Hill...</p>	<p>mechanical properties of materials that persistently develop in recent decades is definitely a fracture mechanics.</p> <p>Without it, it can not be sufficiently successful to analyze the limit forces in wood structures as well as in the process of cutting various materials. It is also necessary to take into account the combination of all the above-mentioned stress conditions in the fracture processes.</p> <p>The contents of the course include: The basics of fracture mechanics of isotropic and orthotropic materials, such as wood and wood composites. Basic modes of fracture mechanics: I, II and III (tensile, shear). Combination of normal and shear modes. Distribution of stress in front of the crack tip. The importance of the critical intensity of stress and fracture energy in the process of creating new surfaces. The impact of the critical stress intensity factors on the size of the destructive load of the material. The effect of the crack size on the destructive load of the material. Differences between fragile and ductile materials. Stable and unstable progression of cracks. Crack initiation. Methods of determining the critical stress intensity factors and strain energy rates. The influence of the shape and different sizes of samples to determine the fracture properties of the material. The influence of a combination of various stress conditions on the collapse of the material. Different failure criteria: TSAI-Wu, Puck, TSAI-Hill ...</p>
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Temeljna literatura in viri/Readings:

<p>Smith, Ian / Landis, Eric / Gong, Meng. 2003. Fracture and Fatigue in Wood, Wiley & Sons Ltd Kumar, Prashan,t 2009. Elements of fracture mechanics. New Delhi [etc.] : Tata McGraw-Hill Vojvodič-Tuma, Jelena. 2002. Mehanske lastnosti kovin, Ljubljana : Fakulteta za gradbeništvo in geodezijo (izbrana poglavja) Izbrani članki v domačih in tujih specializiranih strokovnih in znanstvenih revijah.</p>
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Cilji in kompetence:

<p>Cilji:</p> <p>Pridobiti poglobljeno znanje o sodobnih mehanskih lastnosti materialov kot je lomna mehanika v različnih procesih in gradnji z lesom. Pridobiti znanje za določevanje lomnih lastnosti materialov in jih ustrezno uporabiti v različnih primerih.</p> <p>Kompetence:</p>	<p>Objectives and competences:</p> <p>Objectives:</p> <p>Obtain in-depth knowledge of modern mechanical properties of materials such as a fracture mechanics in various processes and wood construction. Acquire knowledge to determine the fracture properties of materials and use them accordingly in various situations.</p> <p>Competences:</p>
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Študent samostojno ovrednoti pomen in velikost lomnih lastnosti materialov v različnih situacijah ter tako ustrezno ukrepa oziroma določi mejne porušitvene obremenitve v različnih primerih.	The student independently evaluates the importance and size of the fracture properties of materials in various situations, thus taking appropriate action or determines failure loads in various cases.
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Predvideni študijski rezultati:	Intended learning outcomes:
Znanje in razumevanje: Poznavanje lomnih lastnosti različnih materialov glede na specifične obremenitve. Razumevanje napredovanja razpoke v procesu loma materiala v različnih primerih.	Knowledge and understanding: Knowing the fractures of different materials according to specific loads. Understanding cracking in the process of material fracture in various situations.

Metode poučevanja in učenja:	Learning and teaching methods:
Predavanja (10 ur), Seminarji (20 ur), Laboratorijske vaje (10 ur), Drugo (5 ur)	Lectures (10 h) Seminar (20 h) Laboratory work (10 h) Others (5 h)

Načini ocenjevanja:	Delež/Weight	Assessment:
Izdelava in zagovor seminarja	100,00 %	Seminar work and its presentation

Ocenjevalna lestvica:	Grading system:
5 - 10, pri čemer velja, da je pozitivna ocena od 6 - 10	5 - 10, a student passes the exam if he is graded from 6 to 10

Reference nosilca/Lecturer's references:

Merhar Miran

- MERHAR, Miran, MOUTOU PITTI, Rostand, ARGENSSE, Tom. Mode I fracture properties of thermally-modified spruce wood (*Picea abies*) at different moisture contents. *Wood material science & engineering*. 2023, str. 1-1 ISSN 1748-0280. <https://www.tandfonline.com/doi/full/10.1080/17480272.2023.2228280>, DOI: 10.1080/17480272.2023.2228280.
- MERHAR, Miran. Application of failure criteria on plywood under bending. *Polymers*. 2021, vol. 13, iss. 24, str. 1-21, ilustr. ISSN 2073-4360. <https://www.mdpi.com/2073-4360/13/24/4449>. [COBISS.SI-ID 90088451], [JCR, SNIP]
- MERHAR, Miran. Določanje statičnega in dinamičnega modula elastičnosti bukove vezane plošče = Determination of dynamic and static modulus of elasticity of beech plywood. *Les*. [Tiskana izd.]. 2020, letn. 69, št. 2, str. 59-69, ilustr. ISSN 0024-1067. <http://www.leswood.si/index.php/leswood/article/view/101>, DOI: 10.26614/les-wood.2020.v69n02a07. [COBISS.SI-ID 44802563]
- MERHAR, Miran, GORNIK BUČAR, Dominika, MERELA, Maks. Machinability research of the most common invasive tree species in Slovenia. *Forests*. [Online ed.]. 2020, vol. 11, iss. 7, 13 str., ilustr. ISSN 1999-4907. <https://doi.org/10.3390/f11070752>, DOI: 10.3390/f11070752. [COBISS.SI-ID 22847747], [JCR, SNIP, WoS do 29. 11. 2021: št. citatov (TC): 2, čistih citatov (CI): 1, čistih citatov na avtorja (CIAu): 0,33]
- MERHAR, Miran. Determination of elastic properties of beech plywood by analytical, experimental and numerical methods. *Forests*. [Online ed.]. 2020, vol. 11, iss. 11, 21 str., ilustr. ISSN 1999-4907. <https://www.mdpi.com/1999-4907/11/11/1221>. [COBISS.SI-ID 38797059], [JCR, SNIP]

6. RADMANOVIĆ, Kristijan, ĐUKIĆ, Igor, MERHAR, Miran, ŠAFRAN, Branimir, JUG, Matija, BELJO LUČIĆ, Ružica. Longitudinal and tangential coefficient chip compression in orthogonal wood cutting. *Bioresources*. 2018, vol. 13, iss. 4, str. 7998-8011. ISSN 1930-2126.
https://bioresources.cnr.ncsu.edu/wp-content/uploads/2018/09/BioRes_13_4_7998_Radmanovic_DMSTL_Longitud_Tangential_Coeff_Chip_Compression_Orthog_Wood_Cutting_13626.pdf, DOI: 10.15376/biores.13.4.7998-8011. [COBISS.SI-ID 2974857], [JCR, SNIP, WoS]